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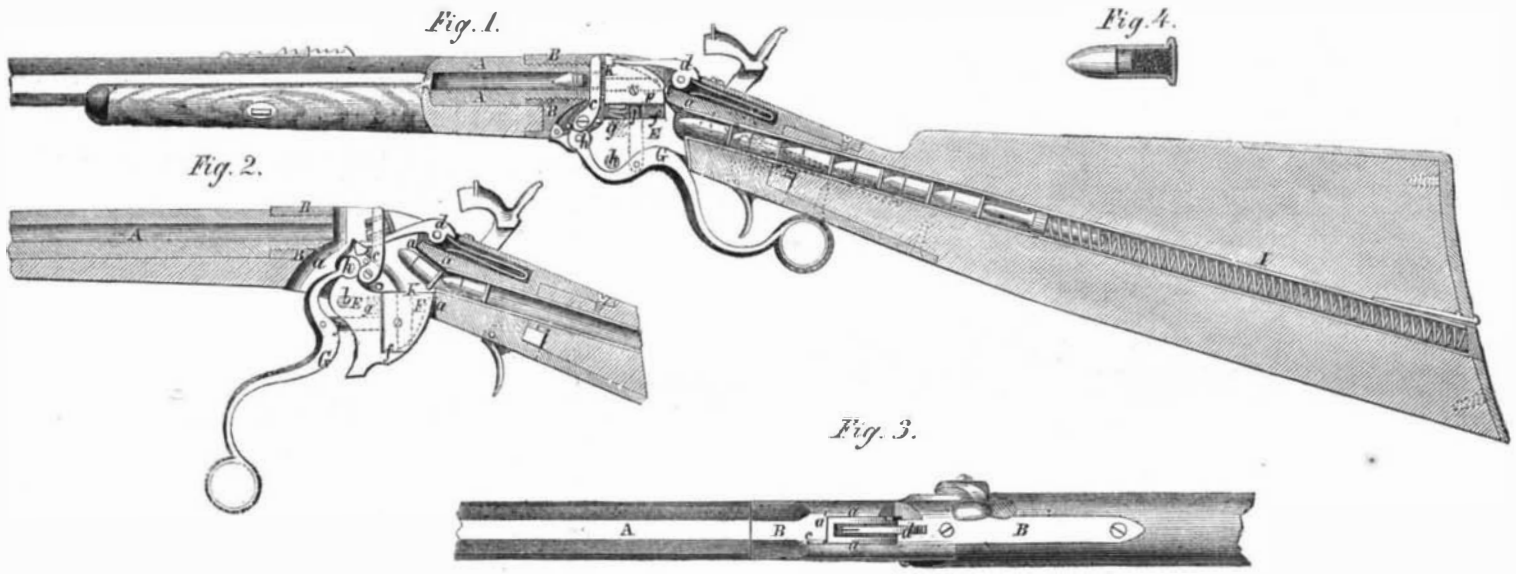
Improvement in Breech-Loading Rifles.

The accompanying engravings illustrate the construction of Spencer's famous breech loading rifle, about which so much has been said, and for which large orders have been issued by government for the use of both the army and navy. It is designed for elongated shot, and has in the breech a magazine of prepared cartridges, which are fed forward into the barrel by a forward and back motion of the trigger guard, operating as a lever; the same motion withdrawing the empty cartridge cases.

The most important features in the invention are the plan for securely locking the breech block, and the arrangements for withdrawing the cartridge cases. Figs. 1 and 2 are sections through the breech and lock of the gun, Fig. 1 showing the parts in the position which they occupy when the gun is loaded, and Fig 2 when receiving the charge. Fig. 3 is a plan view of the upper side of the lock, and Fig. 4 a section of the cartridge. The breech, A, is screwed at the breech into a solid block of steel, B. Directly through this block, B, is cut a vertical slot a little wider than the bore of the gun, to receive the movable parts. Into this slot is fitted a piece of steel, E, of the form of a segment of a circle; this piece being held in place by the pivot, *b*, on which it turns. A notch, *f*, is formed in the piece, E, to receive a block, F; this block constituting the most important feature of the invention. The curved edge of the block, F, coincides with the curved edge of the piece, E, so that when the block is pressed snugly into its notch the two pieces form the segment of a circle, as shown in Fig. 2. When in this position the loaded cartridges are pressed forward from the magazine in the breech by the spiral spring, J, the forward one, *a*, taking the position shown in Fig. 2. The lever, G, is now drawn back to the position shown in Fig. 1. In this motion the shoulder, *k*, formed in the piece, E, presses against the base of the cartridge, and carries it forward into the breech end of the barrel. During this motion the block, F, is held into its notch by the curved walls of the slot in which it moves until it reaches the position shown in Fig. 1. At this point the slot is so formed as to permit the block, F, to rise, and it is pressed upward by the spiral spring, *g*, closing the breech behind the cartridge, and resting firmly against the square wall, *a'*, of the slot, as represented. In this position the rifle is to be discharged. After firing, the lever, G, is again carried forward into the position shown in Fig. 2. The first part of this motion draws the block, F, down into its notch; the lever, G, turning upon the fulcrum, *h*, and acting upon the block through the medium of the rod, *j*. As soon as the block, F, is drawn home into the notch the fulcrum of the lever, G, is changed to the pivot, *b*, around which the piece, E, with the block, F, then turns. This motion also withdraws the empty cartridge case from the barrel. To this end a small lever, *c*, is pivoted at its lower end to the piece, E, in such position that it may catch forward of the lip on the base of the cartridge. At the same time a second lever, *d*, has its forward end tipped down into the slot, forming a slide up which the case is drawn.



SPENCER'S BREECH-LOADING RIFLES.

The great objection to breech-loading rifles—the leaking of the gas through the joints—having been overcome by the use of the copper cartridge case, there can be little, if any, doubt that this class of weapon will come into general use, and the rifle which combines the greatest advantages will take the lead in the market. It is claimed for this rifle that while in facility for loading and firing it is unsurpassed, it is unusually strong in the weakest part, and closes the breach in a remarkably secure and solid manner.

This rifle was invented by C. M. Spencer. The invention has been secured by Letters Patent, through the Scientific American Patent Agency, in the United States, England, France and Belgium; the American patent bears date March 6, 1860, and has been assigned to Cheney Brothers, who may be addressed for any information in relation to it at Hartford, Conn.

Type metal is composed of 100 parts, by weight, of lead, 28 of antimony and 4 of tin. About five per cent loss is usually entailed in forming this alloy.

The Devotion of Agassiz to Science.

Shortly after his arrival in this country, Agassiz delivered several lectures on Ichthyology, in the old Crosby-street Medical College. Prof. Redfield got up a dinner in honor of "the immortal Swiss," as some called the learned stranger. To this dinner were invited the different scientists of thecity. In the meantime, a fisherman had caught a rare fish, and conveyed it to Agassiz. It was enough. Immured in a private room assigned him in the college, he set to work on the study of his new acquisition. An attempt to inject the specimen proved both difficult and tedious. At length the dinner hour, three o'clock, had nearly arrived, when a scientific gentleman, assisting him, ventured to suggest that it was high time to go to the dinner. To which the absorbed philosopher replied, in utter astonishment, "Leave this to go to dinner! My dear sir, these opportunities are rare; time is precious. This specimen can only last a few hours; and I find it already affording valuable proof of its alliance with a species of the Mediterranean Sea. Sir, I dare not trifle with such an opportunity. The fact I am in pursuit of, I may never again have another so favorable opportunity to determine." The fish philosopher resumed his study; and the Agassiz dinner went off like the play of "Hamlet" with Hamlet left out.

Dr. Trumbull, of Liverpool, states that the sulphate of aniline is a new and powerful remedy for nervous diseases, such as St. Vitus's dance. He states that he has tried it in several cases of nervous twitching, and in one of paralysis, with complete success. It produces the remarkable effect of coloring the skin when taken internally, but this disappears in a few days after it has ceased to be used.

When beef fat and mutton fat are dissolved in benzole the former will crystallize at 68° Fah., while butter will remain soluble until it reaches 53° Fah., when it falls in masses of beautiful velvety crystals. By this method of treating, the adulteration of butter with fat can easily be detected.

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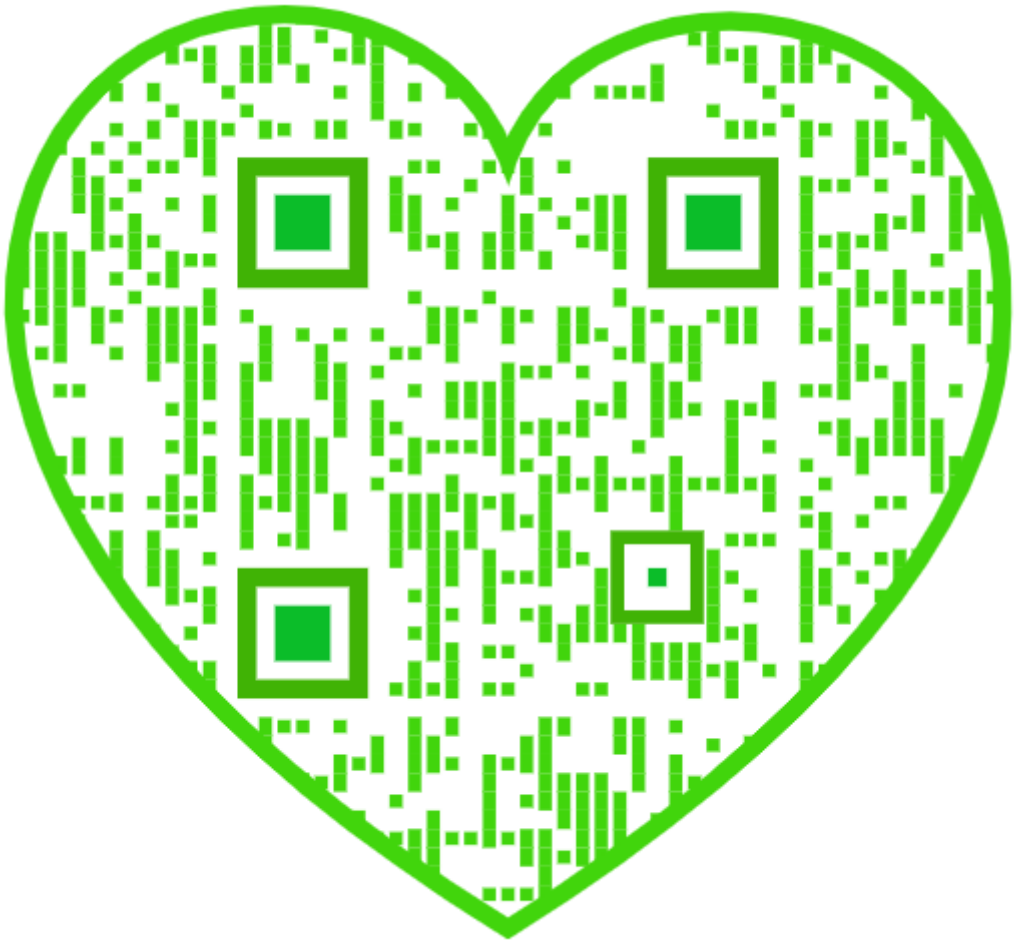

NOTES ON MILITARY AND NAVAL AFFAIRS.

MISSISSIPPI EXPEDITION.

The long talked of Expedition down the Mississippi river, judging from its formidable character, is quite likely to strike a heavy blow to Secessiondom. The most extensive preparations have been made for this expedition, which has been planned by the most skillful military and naval authorities in the Western Department. Next to the overpowering numbers of the expedition is the formidable character of the floating batteries, which will form a component part of it. The total number of boats is 79, of which 12 are gun boats, 38 mortar boats and 28 are tugs and steamboats. The gun-boats are as follows:—

	Guns.		Guns.
Benton	18	Pittsburgh	15
Essex	15	Cincinnati	15
St. Louis	15	Louisville	15
Carondelet	15	Conestoga	15
Mound City	15	Lexington	15
Cairo	15	Tyler	15

Seven of these boats cost $89,000 each to build. They are 175 feet in length, 51 feet, six inches in breadth, and draw five feet when loaded. The bows and bow bulwarks consist of about three feet of oak timber, bolted together and sheathed with the best quality of wrought-iron plates, 2½ inches thick. The sides have the same sheathing, with less bulk of timber. Each boat is pierced for fifteen guns, four on each side, four on the stern and three at the bows. The bow guns are 84-pounder rifled cannon; the others are 8-inch Columbiads. The sides of the boats, both above and below the knee, incline at an angle of 45°, and nothing but a plunging shot from a high bluff could strike the surface at right angles. The boilers and machinery are so situated as to be perfectly protected, and may be considered quite out of danger. The iron plating has been severely tested by shots from rifled cannon, at different distances, and has shown itself to be utterly impervious to any shots that have been sent against it, even at a range of 300 yards. The mortar-boats are built of heavy timbers; the sides are of boiler-iron; they are loopholed for musketry; and are so arranged that they can be used for bridges. They will each carry one 15-inch mortar. The mortar-boats will be towed into position by tugs. With this formidable armament and a force of 75,000 men, the onward march must be comparatively resistless. The progress of the flotilla will probably be by the Mississippi to Columbus and Memphis, by the Tennessee to the mouth of the Sandy River, and by the Cumberland River to Nashville. It appears to us that we shall be making history very rapidly within a few days.

THE BURNSIDE EXPEDITION.

The departure of another combined military and naval expedition to operate on the Southern coast, is the great event of the past week. It has been in process of organization for several weeks past and is under command of Brig.-Gen. Ambrose E. Burnside. Gen. Burnside is a native of Indiana, and is now 38 years of age. At the age of 17 years he entered West Point, and was graduated in 1847. He was breveted second lieutenant in the Second Artillery, and was transferred the next year to the Third Artillery. Joining his regiment in Mexico, he marched in Patterson's column to the city of Mexico, where he remained till peace was declared. Returning to the North, he was stationed at Fort Adams, in Newport harbor. In 1849 he was attached as a first lieutenant to Capt. (now rebel General) Bragg's battery, and was engaged for three or four years in frontier service in New Mexico. In an engagement with the Apalaché Indians in August 1857, near Los Vegas, Lieut. Burnside commanded a company of 29 men, who killed 18 Indians, took 9 prisoners, and captured 40 horses. For this action he was recommended for promotion. He afterward served as Quartermaster to the Commission which surveyed the boundary line between the United States and Mexico. In 1851 he crossed the Plains from the Gila river through the Indian territory, traveling 1,200 miles in 17 days, with an escort of but three men, bringing dispatches from Col. Graham to the President. Lieut. Burnside was next stationed at Fort Adams, and while there he resigned his commission for the purpose of devoting his attention to the manufacture of a breech-loading rifle of his own invention, and took up his residence at Bristol, R. I. His new enterprise proving unfortunate, he went to Chicago and entered the office of the Illinois Central Railroad Company as Cashier of the Land Department, while George B. (now General) McClellan was General Superintendent, and afterward Vice President of the company. After holding the position of cashier for two years, Burnside was elected Treasurer of the company, and removed to New York. While acting in this capacity, soon after the outbreak of the rebellion, he received a telegraphic dispatch from Gov. Sprague, notifying him that the Frst Rhode Island regiment of 1,000 men was raised, and asking him to take the command. In half an hour he left his office and was on his way to Providence. The regiment was one of the first which went to Washington, and took part in the engagement at Stone Bridge, Col. Burnside acting as Brigadier General during the battle. His conduct on that occasion commended him to the attention of the authorities at Washington, and on the 6th of August he was appointed Brigadier General of volunteers. Gen. McClellan, who knows his worth and military capacity, has selected him to command one of the most important expeditions projected since the commencement of the war.

Gen. Burnside is to be assisted in his operations by Brigadier Generals John G. Foster, Jesse L. Reno and John G. Parke, all experienced officers and graduates of West Point. The exact number of men composing the military forces of Gen. Burnside is wisely kept from the public. We expect soon to hear the results of its operations. The naval forces are under command of Capt. Samuel F. Hazard, an officer of experience and ability. The armament of the gunboats is of the heaviest caliber, 100-pounders Parrott rifled guns and 9-inch Dahlgren guns forming the chief portion of the ordnance carried by these boats. They will make a loud noise somewhere and in our next we hope to chronicle its success. The expedition sailed from Fortress Monroe on the 11th and 12th inst.

USE OF CAVALRY IN BATTLE.

Considerable has been said for and against the employment of cavalry, and the matter is one of serious importance, as the cavalry regiments now in the government service are costing millions of money, and if no advantage is to be gained therefrom some measures ought to be taken to get rid of this arm of the service. With the improvement in firearms, a writer on war seems to think horses are losing their value in battle. He says:—"Let the horse be ever so swift, the saber ever so sharp, or the rider ever so bold, the conical ball is too much for him. A charge of cavalry upon a body of properly armed infantry bids fair to be henceforward impossible. Two hundred yards has been fixed by the best authority as the proper charging distance, and in bygone days it was only at two hundred yards that the fire of a squadron began to tell, and saddles to be emptied. But now-a-days the iron rain patters on the horsemen before they get within half a mile of the foe. If they quicken their pace to close, the maddest charge will not bring a dragoon horse on the bayonet in less than three minutes, and when he arrives he is blown and disabled. 'When he arrives'—if he arrives, we should say; for even in traversing eight hundred yards at the top of his speed he receives half a dozen volleys from practiced sharpshooters. To send cavalry on such service will, we may safely predict, henceforward be considered madness. The foot soldier has a swifter messenger in his cartouch box than the fleetest hussar."

THE PENSACOLA

The steamship *Pensacola*, which has recently been finished at the Washington Navy Yard, at great expense, came near being a useless appendage to the naval power of the country, owing to the blockade of the Potomac by the secession batteries. She has succeeded, however, in making her way down that famous stream in spite of those batteries. She was several times fired at, but sustained no damage. One shot passed harmlessly through her rigging; the rest missed fire altogether. The *Pensacola* is now safely at anchor in the harbor of Annapolis, awaiting orders.

CAMPAIGN IN KENTUCKY.

Humphrey Marshall, of Kentucky, was, for several years an honored member of that gallant State in the United States Congress. He is a graduate of West Point, and was generally esteemed as a brave and chivalrous man. Humphrey is, moreover, a very *pussy* man; in other words, he is inflated, swelled, fat, short and thick, and of laborious respiration. Usually conservative, he was, strange to say, one of the first public men of Kentucky to espouse the cause of secession, and vehemently declared that his State should never feel the tread of the Union invader without first passing over his dead body. This declaration led the facetious Prentice of the Louisville *Journal*, to declare that if such was really Humphrey's determination, the government might as well give it up at once, as the obstacle would be too great. Humphrey was at last commissioned a Brigadier General in the Confederate service, and at the head of a valiant army of troops—who, like the men of Falstaff, had a shirt and a half to every hundred men—set out to seize the loyal city of Frankfort, there to spread himself out in the enjoyment of all the luxuries which fond fancy had conjured to his view. He commenced his march—

"all the while
Sonorous metal blowing martial sound;"

and when near Paintsville, in Johnson Co., he heard of the approach of the Federal forces under Col. J. A. Garfield. This seems to have scared him, and with his whole force he fled in wild confusion. On the 11th Col. Garfield left Paintsville with 1,100 men, and moved toward the main body of the enemy at the forks of Middle creek, under command of Marshall. Skirmishing began at 8 o'clock in the morning, "and at 1 P. M.," says Col. Garfield, "we engaged the enemy's force of 2,500, with three cannon posted on the hill. We fought them until dark, having been reënforced by about 700 men from Paintsville, and drove the enemy from all his positions. He carried off the majority of his dead and all his wounded. This morning we found 27 of his dead on the field. His killed cannot be less than 60. We have taken 25 prisoners, ten horses and a quantity of stores. The enemy burnt most of his stores, and fled precipitately in the night. I have crossed the river, and am now occupying Prestonburgh. Our loss is two killed and twenty-five wounded." Humphrey is too fat to fight. He can't stand a long tussle; and the sooner he settles down somewhere the easier it will be for him. His locomotion is not adapted to a war footing.

Gen. Buell has organized his army into five divisions, commanded respectively by Gens. McCook, Mitchell, Nelson, Thomas and Crittenden. His force appears to be very formidable, being composed of 114,000 men, with over 100 pieces of artillery. 75,000 of these men are pronounced fit for the field, and are brigaded; a strong reserve will be formed of the rest. Gen. Buell's army is well equipped for active duty, and is gradually approaching the secession force.

MISCELLANEOUS.

Matters at the various navy yards are very active. At the shipyard of Messrs. Cramp & Son, Philadelphia, an iron-clad steamer is progressing quite rapidly. One peculiarity in the construction of the hull is, that her sides above the water-line fall off at an angle of above 30°, so that a ball striking her from almost any range would glance off.

A Philadelphia firm has received a contract for the manufacture of 50,000 Springfield rifled muskets for the government.

Gen. Halleck sent the following brief but pointed dispatch to Gen. Hunter, commanding the Kansas department:—

ST. LOUIS, January 2, 1862.

Price was at Springfield two days ago, and has probably been attacked by 2,000 of our cavalry to-day. If necessary, they will soon be sustained by artillery and infantry. He will leave the State either willingly or forcibly. His day is over. Encourage John Ross and friendly Creeks.

Gen. Halleck received the following dispatch from Gen. Palmer, dated Otterville, Mo., Jan. 10:—

On the 8th inst., at 4 o'clock P. M., Majors Terrence and Hubbard, with 450 men, attacked Poindexter, with 1,000 to 1,300 men, on Silver Creek. The enemy was totally routed, with heavy loss. Seven left dead on the field, many carried off, from 50 to 75 wounded. Our loss reported at four killed. The rebel camp was destroyed and a large number of horses and arms taken. A heavy fog alone saved them from complete destruction. The number of prisoners taken is reported at 30.

THE price of indigo has risen to such a point that lighter shades of blue cloth are admitted by government for army purposes.

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Metallurgy of Copper and Zinc.

The following is the substance of several lectures on the above subject by Dr. Percy, of London, and published in the *Ironmonger*:—

The metal copper is remarkably distinguished by being the only one of a red tint (the so-called red metal titanium having been ascertained to be a compound of titanium and nitrogen). Copper is the most malleable of all the ordinary metals, and is fusible, or melts, at a degree of heat between the melting points of silver and gold. It remains unchanged for any length of time in dry air at ordinary temperatures, but when moisture is present it rusts, forming an oxide, which uniting with carbonic acid forms a green carbonate of copper. At a red heat it unites with oxygen, being converted into scale or red oxide of copper; this when heated to a higher temperature absorbs more oxygen from the air, and becomes black oxide of copper. This black oxide is the base of the salts of copper, such as blue vitriol or sulphate of copper, and on the addition of an alkali to a solution of these salts, the black oxide is precipitated in combination with water as a blue hydrate. If ammonia is employed in large excess this is dissolved with the formation of an exquisite blue color. Melted with glass these two oxides give very different results, the red oxide imparts a very fine red color, the black a bluish green. Copper readily enters into combination with sulphur, especially if the union is aided by heat. When the mixture becomes red hot, and a sulphide of copper is formed; it the sulphide is heated in the open air the sulphur it contains burns away, and by regulating the amount of air, the temperature and the rate of combustion, the process can be so managed as to leave pure copper, or oxide of copper, or sulphate of copper.

The formation of oxide of copper by heating the sulphide is the basis of copper-smelting operations.

The general principle of the process may be thus stated: common copper ores consist of sulphides of copper, or compounds of copper and sulphur; these when heated in the air, may be converted into oxide of copper. When this is again heated with some sulphide of copper which has not been acted upon, the oxygen of the oxide and the sulphur of the sulphide unite, and form sulphurous acid, which passes away as a pernicious gas, and the copper of both remains.

When copper is kept melted for some time in the open air, its properties are materially altered; it becomes what is termed dried copper. This change arises from a quantity of the oxide being dissolved by the copper, sometimes as much as even 13 per cent. Dried copper is brittle, has a purplish red tinge when broken, and if cast, the ingot, or casting, has a furrow on the top from the metal shrinking as it comes solid. This dryness can be removed by the addition of charcoal, wood, or any deoxidizing agent at a red heat; but if too long heated with charcoal, the copper acquires singular properties, the ingot is brittle, and when broken, shows an orange fracture and peculiar cavities; instead of having a depression or furrow on the upper surface, there is a ridge or prominence the whole length of the ingot; copper in this condition is said to be over poled. Between these two extremes is a medium quality which possesses the maximum toughness that the metal is capable of possessing, and the ordinary color. Casting in pure copper is a difficult operation, as the metal generally protrudes, and the casting is unsound; there are, however, several substances that produce sound castings when added even in very small quantities to the melted copper; among others may be mentioned tin, zinc, metallic arsenic and phosphorus. In France, furnaces of copper works have been constructed with bars, placed three-eighths of an inch apart at the top, each bar being five inches deep and half an inch wide above, and one-quarter of an inch wide below. In some parts of Germany small coal is used in furnaces having what is termed a step-grate, the bars being broad on the upper surfaces, and placed one above the other. In these, the small coal rests on the bars without falling through, though the air has free access to the burning fuel.

In describing the wasteful results arising from ignorance of the composition of the various products of metallurgic operations, Dr. Percy stated that the slag from the refining furnace was formerly thrown away, though containing 60 per cent of copper; and that in the dock yards, in the waste arising from the melting of the old copper sheathing, hundreds of tuns of copper had been consigned to the dust heap. As a parallel case, it was stated that the black dust that is formed in the manufacture of tin plates was, until recently, wasted, although containing about 60 per cent of metallic tin. Copper possessing a silky fracture of a salmon-red color, usually has the valuable qualities of tenacity and malleability developed to the highest extent; the exact quality of the metal cannot, however, be ascertained in all cases by the fracture, as very different qualities may show a fracture of precisely the same character.

As an illustration of this fact, it was mentioned that the copper supplied to the government dock-yards was formerly tested solely by the appearance of the fracture, and that on one occasion, when a large quantity was rejected, the smelter received it back, and after having melted it with such precautions as insured its having a different fracture, returned it to the dock yard, when it was at once accepted. The effect of the presence of small portions of other metals in altering the character of copper was dwelt upon. Tin, as shown in the new bronze coinage, increases its hardness, but naturally lessens its malleability and ductility. The presence of lead to the extent of from one-quarter per cent to three-eighths per cent, has a very marked influence in increasing its power of being drawn into fine wires, or rolled into sheets. Copper with this proportion of lead is known as tough-cake, or rolling-copper. The copper from Japan is received in small bars, often of the most exquisitely beautiful ruby tints, which are evidently owing to a thin layer of the red oxide on the outer surface. In making a series of experiments on this subject, Dr. Percy found that fused copper could be most readily cast in water, and that without any danger of explosion or inconvenience from the escape of steam.

Dr. Percy's method consisted of placing a number of horizontal bars of iron parallel to one another, so as to form a sort of coarse gridiron, with the angles of the bars upward and downward. Over this was laid a piece of coarse, stout canvas, which, on being depressed, formed a series of gutters or troughs between the bars; these gutters were then partially filled with water, the canvas being sufficiently retentive to prevent its rapid percolation; this being done the melted metal is poured into the gutters, where it flows along the bottom of the water and consolidates into a solid bar. This casting under water is in itself interesting, but the circumstances attending it are no less so; in Dr. Percy's experiments he found that perfectly pure copper assumed, under these conditions, the color of brass, owing evidently to the formation of some thin film of oxide on the outer surface.

Curing Hams.

Few persons understand the proper ingredients, and exact proportions, to make a suitable pickle for curing hams. This is the season when such information is useful. The desideratum is to cure the meat, so that it will keep in hot weather, with the use of as little salt as possible. Pickle made in the following manner, it is believed, will accomplish this:—

1½ lbs. of salt—coarse or alum salt is best.
½ oz. saltpetre.
1 pint of molasses, or 1 lb. of brown sugar.
1 teaspoonful of saleratus.

Let these be added to one gallon of water, and the amount increased in the same proportions to make the quantity required. Bring the liquor to a boil, taking care to skim just before it begins to boil. Let the pickle cool, and pour it over the meat until entirely recovered. The meat should be packed in clean, tight casks, and should remain in the pickle six or seven weeks, when it will be fit to smoke. Green hickory wood is the best article for this purpose. Shoulders prepared in the same way are nearly as good as hams. This pickle is just the thing to make nice corned beef, or corned beef tongues, or any lean meat for drying.—*Valley Farmer*.

GUNSMITH'S soft solder is composed of two parts of tin and one of lead; plumber's solder, one of tin and one of lead.

A VERY fusible alloy is composed of one ounce of lead, one of bismuth and one of zinc.

The Coal Production of Pennsylvania.

The Pottsville papers publish annual tables of the coal production of the Schuylkill region, with statistics embracing the extent of the coal business in other parts of the State and the U. S. The derangements in the business of the country have operated injuriously upon the coal interests, the decrease being 584,109 tuns from all the anthracite coal fields, and 419,340 tuns from the semi-anthracite bituminous coal fields and importations. Nearly all this decrease in the authracite coal trade is in the Schuylkill region, and arises from local causes and disadvantages connected with the trade of that country, which has been advantageous to rival coal, producing regions. The whole anthracite coal trade of Pennsylvania for the year runs up to a very large figure with these deductions. It amounts to the sum of 7,474,-908 tuns, which, at an average price of $3 50 per tun, at Philadelphia, would be worth twenty-six millions of dollars. The semi-anthracite and bituminous coal amount to $826,177 tuns; imported $200,000. Making the entire amount of coal of all kinds, 8,417,085 tuns. All of which was destined for the seaboard except about 400,000 tuns of anthracite from Shamokin, Scranton and Pittston, which was sent into the interior of Pennsylvania and New York.

South Carolina Cotton Sold at Auction.

In our last number we noticed the arrival of the steamship *Vanderbilt*, from Port Royal, with a cargo of sea-island cotton on board. The first auction sale of this cotton was made on 10th inst. by Messrs. Burdett, Jones & Co., under authority of the government. The first lot, consisting of 1,435 pounds, was sold for 63 cents to Messrs. Truesdall & Greene, of this city. The second lot consisted of nine bales weighing 2,765 pounds. It was marked with an octagon. Some laughter was occasioned by a remark of the auctioneer, who mistook the octagonal sign for a coffin:—"A coffin—Death in it. How much do you say?" The lot was started at thirty-five cents and sold at fifty-six and half cents, also to Truesdall & Greene. There were ten lots sold in all, consisting of 79 bales, averaging nearly 60 cents per pound, with the exception of ten inferior lots, which sold at 18 and 25 cents respectively. The amount of money realized was upward of $14,000.

VETERINARY SURGEONS FOR THE ARMY.—In view of the vast number of valuable horses purchased by the government to mount its cavalry regiments, of the enormous amount of money they have cost, and the various dangers and often fatal ailments to which they are liable through exposure, it is absolutely necessary that some provisions should be made for the appointment of a veterinary surgeon to each regiment. To say nothing of humanity to the animals, which may be suffering under acute attacks which a skillful veterinarian could soon remove, the protection and preservation of the government property in this great branch, and the vital efficiency of the regiments, appear to us to demand this measure. The value of the trooper depends in a large measure upon his horse, and if the rapid march, skirmish or battle finds him upon one sick, lame or halt, his efficiency will certainly be destroyed.—*Wilkes's Spirit*.

VALUE OF A DEAD HORSE IN LONDON.—Hair, from 8d. to 1s— used for haircloth mattresses, in crushing seed in oil mills; hide and tendons, 8s.—leather, glue, gelatine; flesh, £1 8s.—meat for men, dogs and poultry; heart and tongue—a mystery; intestines—covering sausages and the like; fat, 3s. 4d. used for lamps, after distilling; bones, 4s. 4d. per cwt.—knife-handles, phosphorus and superphosphate of lime; hoofs 8s. to 10s.—buttons and gelatine; shoes, 1s. to 2s.—old iron. Total value, from £2 17s. 6d. to £3 4s. 10d.

WE learn from the *Ledger* that 1,825 buildings were erected in Philadelphia last year—being 792 less than the previous year. About two-thirds of these houses were three-story dwellings, and quite a number of them were first-class buildings.

COTTON FROM ENGLAND.—The Lowell *News* states that orders have been sent to Liverpool for full 50,000 bales of cotton, which is nearly a quarter of the whole stock on hand by our factory corporations.

THE barrels of good shot guns are made 45 times longer than the diameter of the bore.

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SURFACE CONDENSERS FOR STEAM ENGINES.

Number III.

We hear but little more of surface condensation until about 1830 to 1835, when Mr. Hall, of Nottingham, again brought the subject before the public, and very successfully applied it to the engines of several steam vessels. In his first patent the tubes were placed horizontally, and were partially closed at each end, so that a portion of the condensation water might remain in them, the condensing water flowing round their exterior surfaces, and the exhaust steam passing through them. In the process of condensation the tubes soon became partially filled with water, and it was thought that the steam impinging on its surface would be more rapidly condensed. This, however, was not found to be the case, but, on the contrary, did not prove so efficient as the plain metal surface. It was, therefore, abandoned in favor of the arrangement (shown in diagram 5) which was applied to the steamship *Hercules*, of 180-horse power, as also to upward of twenty other large steam vessels, both in the merchant service and the Royal Navy.

The diagram (5) is an elevation of the engines of the *Hercules*, in which it will be seen that the steam from the cylinder enters the upper chamber, A, of the condenser, which communicates with the lower chamber, F, by the tubes, B, contained in the cistern, C. These tubes are surrounded by cold water which enters the cistern by the opening, D, and flows off at the opening, E. G is the air pump, by which the water formed by the condensation of the steam in its passage through the tubes, together with any air or uncondensed steam may be present is drawn off from the condenser, and conveyed through the feed pipe, H, to the boiler.

In order to effect an equal distribution of the steam among the pipes, a perforated plate, K, is fixed in the upper chamber, A, a short distance above the tubes.

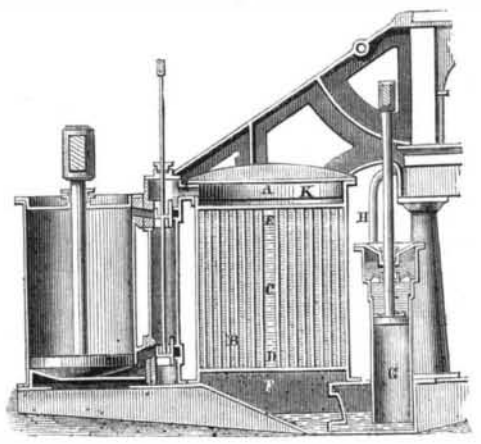
Having briefly traced the history of surface condensation, we will now proceed to enumerate the advantages it possesses as compared with the injection system, especially with the reference to the marine steam engine.

In the ordinary injection condensers the steam is necessarily mixed with the condensing water, and, consequently, whatever impurities this water contains are continually, by means of a feed pump, forced into the boilers. In ocean steamers this circumstance is of serious importance, inasmuch as sea water contains in solution as much as 3 per cent by weight of common salt, a proportion which, large as it is, becomes rapidly increased or concentrated by constant evaporation. Sea water also contains small quantities of salts of lime and magnesia, and occasionally other impurities, all of which combining with the salt are deposited on the surfaces of the flues or tubes, and soon form thereon a thick crust or scale, which, when once firmly attached thereto, is with great difficulty removed—so much so, indeed, that the comparative durability of land and marine boilers, owing to this cause, and also to the corrosive nature of sea water, is about as seven to one against the latter. Much of the salt and other freely soluble matter is, however, got rid of by the comparatively simple but expensive process of "blowing off." By this process, when the water in the boiler is found to have reached a certain degree of density, which is ascertained by means of an instrument called a salinometer, a considerable portion of it is blown out, and, this being in a boiling state, all the heat imparted to it is of course wasted.

This process is repeated generally at intervals of about two hours, and in this manner from one-third to as much as two-thirds of the water supplied to and heated in the boiler is blown to waste. In this manner from 10 to 30 per cent of fuel is, in reality, thrown away by the wasteful process of blowing off. Notwithstanding that this process is constantly carried on, a scale or deposit forms more or less quickly, in proportion to the temperature of the water, or, in other words, the pressure of steam in the boiler. This has to be chipped off, at a great expense of time and labor, and not unfrequently injury to the boiler. If the removal of the scale is neglected, its pernicious effects are soon perceived; for, in the first place, being a bad conductor, it impedes the passage of the heat from the fuel to the water, and causes thereby a wasteful expenditure of fuel, and if it is allowed to accumulate the heat is almost entirely prevented from passing through, and the plates of the boiler become heated to an extent rendering collapse of the crown plates of the furnace a by no means uncommon occurrence, and occasionally causing much more serious injury.

Now, in surface condensers, as has been shown, the exhaust steam is not allowed to mix with the condensing water; hence the product of condensation in the form of pure water is alone returned to the boiler; consequently the evils of the injection system above detailed are by this simple means obviated. It has been found in practice that boilers used with surface condensers will last about three times as long as those where injection condensers are used. In addition to which the tallow used in lubricating the piston and cylinder which, in ordinary practice, is, in a great measure, passed away with the injection water, is partly returned to the boiler, and, floating on the surface of the water, effectually protects those parts which are most subject to oxidation; nor are the

Fig. 5.



boilers liable to be injured or destroyed by the water becoming too low, for as every cubic foot of water converted into steam in the boiler is, by condensation, reconverted into the same quantity, and returned in its integrity to the boiler—the bulk, and consequently the hight, is maintained the same, with the exception of a trifling amount of loss by leakage, &c.

The boilers may also be made of a much smaller size, as no allowance is needed for blowing off, and, as no deposit can take place, or scale form, the conducting power of the plates or tubes would remain unimpaired, and, consequently, would admit of their heating surface being considerably reduced. This has been proved in the steamship *Mooltan*, belonging to the British Peninsular and Oriental Steam Navigation Company, whose engines have produced very good results, with boilers only about half the size of those used in the navy for engines of similar power not using surface condensers. The air pump, which serves also as feed pump, is much smaller, as it has no injection water to remove from the condenser against a vacuum, as is the case when injection condensers are used, and but very little air, viz., that which may accidentally leak through defective joints or imperfect stuffing boxes, and not, as in the injection condensers, all that may pass with the injection water, which, in stormy weather at sea, is very considerable in amount; hence surface condensers generally indicate a greater amount of vacuum. Again, no salt or sand is carried with the steam into the cylinder or air pump, which, under the injection system, are much injured from that cause; but, on the other hand, much of the tallow which, having lubricated the cylinder and piston, and passed from thence through the air pump to the boiler, is again passed with the steam through the engine to be again returned.

Chisholm's Mathematical Mechanical Scale.

This scale was invented by A. M. Chisholm, and is for sale by G. W. Cottrell, No. 36 Cornhill, Boston. It is a piece of pasteboard ten inches square, graduated, lettered and numbered, with a pivoted index, and facilitates the solution of problem in arithmetic, geometry and trigonometry. The key is a book of 16 pages, containing simple rules for the use of the scale. It will be found convenient for persons having occasion to make many calculations, especially for checking the results of other methods.

English and French Iron Ships.

The London *Times* says:—The four improved Warriors ordered and now building—the *Achilles*, at Chatham; the *Minotaur*, at the Thames Ironworks; the *Captain*, at Mr. Laird's; and the *Northumberland*, at Mr. Mare's—are each and all of them to be larger, longer, stronger and swifter than any that have gone before. In fact, when we look back on our brief but vigorous competition with the French, we find that our first attempts at iron ships were in many important particulars below the standard from which the French started with *La Gloire*. But the difference is that the French have adhered to their standard, while we have constantly striven for improvements and more improvements; and the result is that, so far as our present knowledge goes, we have attained perfection, while our neighbors are comparatively still drudging at the bottom of the form. That this statement of the merits of the two countries in iron ships is perfectly well-founded we think we can show. Only a few weeks since one or two of our most eminent shipbuilders, thoroughly conversant with ironsides, visited some of the French dockyards to see what was doing there. They were allowed to inspect some of the iron clad frigates building, all the works connected with which were advancing much more slowly than they had been led to expect. Those which they inspected were merely wooden ships plated, or to be plated, with apparently little, if at all, more than 3-inch iron. They were mostly vessels of from 3,000 to 3,500 tuns; in fact, frigates and two-deckers cut down and much strengthened in their scantling, to enable them to carry armor from end to end. From the want of great tunnage, a flat floor and large displacement, it was evident that they would be so immersed by the weight of their armor as to bring their portsills dangerously near the water, and render their guns all but useless in a seaway. Nor is this their only fault, for their wooden frames, not having the strength of our iron vessels, which are as rigid as bolts, work so much when steaming in a seaway as as almost to work them to pieces, and make docking and fresh caulking necessary after every gale. But the worst of all their defects is that the iron and the oak do not go well together, and we may infer, from the causes being alike in both cases, that the framework of the French ships will rot as quickly as our own floating batteries did—that is to say, within some eight or ten years. These defects are very well known to the admiralties of other governments besides our own, and the result is that the Continental Powers are coming here to have their iron frigates built, instead of going to France; and thus, through the medium of our private firms, encouraging still further the monopoly we have almost gained in the manufacture of these great ships of war.

American Machines in England.

In some remarks lately made before the Bedfordshire Association, England, by Mr. B. Gibbs, he said:—"Gentlemen, the foreigner is placed in different circumstances to ourselves; he has different ideas, different requirements and necessities. 'Necessity is the mother of invention;' and foreigners are, perhaps, more of an inventive turn than ourselves. The result may prove that what originally owes its existence to these causes may eventually be so modified and adapted as to meet some want of our own. Indeed, I may point to the reaping machine as illustrating this. It is true that long before the year 1851, reaping machines had been invented, but their existence was little known. It was not until America exhibited those of McCormick and Hussey in the Great Exhibtion of 1851, that the attention of our English manufacturers was seriously turned to this description of implement, and thus a machine called into existence to meet a foreign want has been adapted and improved so as to meet what I believe to be a want of our own."

The shoots of potatoes exposed to light contain solanum—a powerful poison. The tubers of potatoes which are covered with earth from the light never contain this poison, but if exposed when growing they become green on the skin, which is a sign that this poison has been developed in them. On no account should green potatoes be given to persons or animals.

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Theory of Steam and other Heat Engines.

The following is the substance of a paper on the above subject read beforea late meeting of the Civil and Mechanical Engineer's Society by Mr. Francis Campin, and published in The London *Engineer*. The author stated that the object of the present paper was to raise a discussion upon the generally accepted theory of thermodynamics, which did not appear to him to furnish means for explaining satisfactorily the conversion of heat into motion. If one pound of water be subjected to the action of heat until its temperature is raised one degree, then will the heat consumed be equal to 772 foot-pounds according to the theory of Dr. Joule. Calculating upon this datum, the efficiency of the best steam engine will not exceed one-ninth. It is very important to determine the cause of this low efficiency, whether it be in the medium employed or in the mechanical arrangements, or whether the theory be erroneous. It is necessary to mention circumstances attendant upon the production of motion due to the disappearance of heat, and most important to determine whether the heat is actually annihilated or not. If a cubic foot of water be evaporated against the constant resistance of the atmosphere about 3,454,000 foot-pounds of work will be executed with the disappearance of 62,500 units of heat; but this is not the greatest amount of work to be got out of that quantity of heat. Let the water be confined until the whole of the 62,500 units of heat is communicated to it, then allow the steam to expand against a resistance varying from the greatest pressure (24,000 lbs. per inch) down to the ordinary atmospheric pressure, and about 2,600,000,000 foot-pounds of work will be done, if no heat disappears except that which becomes latent, and which may afterward be obtained by condensation; and this quantity of work is much in excess of what should be obtained, according to Dr. Joule's equivalent.

The foregoing results appear to indicate the inefficiency of Joule's formula, and the calculations seem accurate, as we find that we can, by pursuing a similar course, calculate the amount of work done by any steam engine, without any considerable error accruing.

If a quantity of heat proportional to the work done be actually destroyed, either the temperature of the whole bulk of steam in the cylinder must be thereby reduced, or a portion of the steam must be condensed, in which case it is not easy to explain the *modus operandi* of the steam in producing motion, nor does it appear that actual proof of such destruction of heat exists. The conclusions arrived at are, therefore, that work is obtained by the absorption of heat by the expanding steam, and that the heat may be recovered by condensation. The author next proceeded to explain the advantages accompanying the employment of high-pressure steam with a considerable degree of expansion, and to show that the experiments of Stimers and Isherwood upon the practical value of expansion were useless, and applied only to the circumstances under which they were performed.

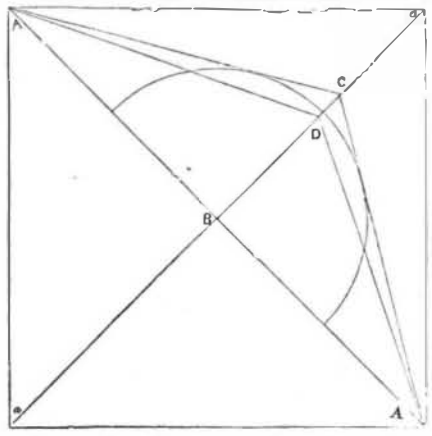
In the opinions expressed in the foregoing words the author was supported by the researches of Seguin, and they were also identical with those expressed in Joseph Gill's "Essay on Thermodynamics,"

Population and Sanitary Condition of New York.

From the annual Report of the Board of Police Commissioners we learn that there is a population of 900,000 in New York, and of this number 404,000 live in tenement houses, and about 21,000 of these in cellars. Tenement houses have become more numerous and crowded than formerly, and, as a consequence, it is stated that the mortality has increased in proportion. Thus in 1832 the deaths averaged 1 in 35½, while in 1861 they averaged 1 in 27½. This increase of mortality is due, in a measure, to over-crowded houses, which have increased in filth, and have become fetid for want of sufficient fresh air. It is the opinion of physicians that the minimum quantity of air space allotted to each person, in a bed room, should be 500 cubic feet—a cube of eight feet space. Less breathing space than this tends to produce disease. There are 267,289 persons in New York who sleep in apartments containing much less space than 500 cubic feet for each. Although there are so many tenement buildings in New York, no other city of the same population contains so many occupied by their owners.

HOW TO CUT A BEVEL FOR A HOPPER.

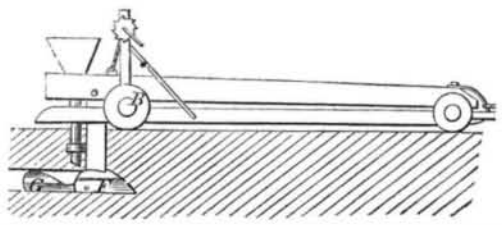
First draw the size of the top of the hopper, A *a* A *a*, then draw lines across it diagonally or across from corner to corner, then measure up from the center, B, at the intersection of these diagonal lines, on one of the



lines, the depth of the hopper to C, then draw two lines from the corners, A A to C, then set the dividers at B and describe a circle just so as to cut the lines, A A and C, then draw lines from A A to D, where the circle crosses the line, B C, and which will be the bevel for the corner piece.

FORMING CEMENT DRAINS.

The advantages of draining land are too well known to require comment at present. The great obstacle to draining on an extensive scale is the expense incurred in digging with the spade and providing the tile used for pressing. The annexed figure represents a mole plow for cutting a drain, combined with a hop-

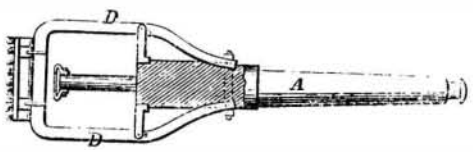


per for supplying hydraulic cement behind the mole; also a spiral conical trowel moving behind, for spreading the cement around the hole made by the plow, so as to form a continuous cement drain by simply dragging the mole plow. F is the mole of the plow. It is connected to the beam by a thin sword standard. The hopper above contains the hydraulic cement, which is discharged by a piston that receives a continual vibrating motion; the cement passes down by the spout into the drain space before the spreading trowel, G, which distributes it around and lines the drain with the cement.

Patented by Augustus Watson, Loudon, Ohio, Feb. 28, 1860.

COMBINATION MOP SCRUBBER.

To render the decks of vessels and the floors of houses perfectly clean, they are first scrubbed with a



brush or broom, then wiped up with a mop. The annexed figure represents a scrubber and mop combined. D is the bow frame which is screwed upon handle A, and holds the cloth for wiping up between the stalk and the foot of the bow. The brush is secured on the lower extremity as represented, so that the operations of scrubbing and wiping may be alternately executed with the same instrument. Patented by R. Price, New York, March 6, 1860.

At the beginning and end of winter there is an appreciable quantity of nitric acid in the atmosphere. It is discovered by exposing iodized paper to its influence. The blue color of the paper soon becomes red. By passing air at such seasons through pure carbonate of lead the nitrate of lead is formed. The formation of verdigris on bronze statues exposed to the atmosphere shows the presence of nitric acid.

Warner's Computation of Earthwork.

We have spent a great many days in measuring and computing the number of cubic yards of earth removed from railroad excavations. The common mode of proceeding is to take the hights of numerous points of the surface before the work is begun. A line of levels is run along the middle of the track, and cross sections of levels are taken wherever the direction of the surface varies. These cross sections are platted upon paper, the mass between them is divided into a number of regular geometrical figures, prisms, wedges and pyramids, and the contents of each figure computed. This process is exceedingly tedious and has demanded an enormous amount of labor on the part of those who have superintended the construction of the thousands of miles of railroads in the country.

Since the commencement of the railway system our civil engineers have been trying to devise some more rapid system of computation, and many formulæ have been offered as solving the problem. It is not claimed for any of these that they are as correct as the division of the mass into regular geometric figures, which is precisely accurate; but it is claimed that some of them approximate sufficiently near for all practical purposes.

A number of works have been published on the subject, discussing the several methods and formulæ at length, each generally defending the author's own plan. The latest of these works has just been published by J. B. Lippincott & Co., of Philadelphia. The author is John Warner, A. M., mining and mechanical engineer, author of "Studies in Organic Morphology." This work is both learned and practical, containing numerous lithographic illustrations of various forms of excavation, with elaborate discussions of the principal mathematical problems involved. The book also embraces a large number of tables for the practical use of engineers who have earthwork to measure, and will be found indispensable to this whole class. Some of the tables pertain to the cubical contents of earthwork, some to the length of subdivisions, some to the dimensions of cross sections, and others to logarithms for assisting in various computations. We extract the following paragraph:—

"The Prismoidal Rule.—Add together the end areas and four times the area of the mid cross section. Multiply the sum thus found by the distance between the end areas, and divide by 6, by 9 and by 3. The result will be the number of cubic yards in the given length of excavation or embankment, as nearly, in our opinion, as by any general rule known."

Agassiz and Oken Dining on Potatoes.

An interesting fact, not without its moral, is told by Agassiz, of his visit, when a young man, to the great German naturalist, Prof. Lorenz Oken. The Professor received his guest with warm enthusiasm, but with apparent embarrassment. He showed his visitor the laboratory, and the students at work; also, his cabinet; and, lastly, his splended library of books pertaining to zoological science, a collection worth some seven thousand dollars, and well worthy the glow of pride which the owner manifested as he expatiated on its excellence. The dreaded dinner hour came, and now the embarrassment of the great German reached its maximum point. "M. Agassiz," said he, with evident perturbation, "to gather and keep up this library exacts the utmost husbandry of my pecuniary means. To accomplish this, I allow myself no luxury whatever. Hence my table is restricted to the plainest fare. Thrice a week our dinner boasts of meat; the other days we have only potatoes and salt. I very much regret that your visit has occurred on a potato day." And so the splendid Switzer, and the great German, with his students, dined together on potatoes and salt.

The survey of a parallel of north latitude, running through Ireland, England, Belgium, Prussia and Russia, is nearly completed, and the accurate length of a base line stretching from the west coast of Ireland to the Ural mountains in Russia will shortly be ascertained. This will be the greatest feat in trigonometrical surveying ever accomplished. In order to triangulate the country along the parallel, stages seventy feet high have been erected on the continent of Europe.

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Correspondence

Large and Small Bore Rifles.

MESSRS. EDITORS :—There are two things for which I must say I have a passion. One of them is the SCIENTIFIC AMERICAN, and the other is rifle shooting. In looking over the pages of the former I have seen several articles, some giving instructions how to shoot, others stating what kind of rifle is considered the best, and as this is the time when wars and rumors of wars seem to be the order of the day, I will, with your permission, make a few observations with regard to rifles, which I think have been overlooked by all your correspondents on the subject.

Your correspondent, "R. H. H.," of Evansville, Ind., gives it as his opinion that "the old short, heavy-barreled rifle, which carries from 60 to 80 balls to the pound is the best for accuracy and length of range." Now, with all due deference to his opinion, I am inclined somewhat to differ from him in some just mentioned. Thus, the two inch ball weighs 1.718 respects, and as he has given no reasons for his opinion, I will state my reasons for differing from him, which are, in the first place, that a barrel which carries from 60 to 80 balls to the pound has not the capacity for burning a charge of powder large enough to drive the ball to any considerable distance. Although I believe, for short ranges, say from 100 to 200 yards, such guns are the most accurate, as the weight of barrel is so great, in proportion to the charge, that there is scarcely any recoil, and this insures steadier shooting at those distances.

But the principal objection which I wish to make to the small ball for long ranges is the obstruction which the atmosphere presents to its flight, the influence of side winds, &c., which it has to encounter in long ranges. To make the thing perfectly understood I here give the weight of two balls of different sizes, the one two and the other four inches diameter, also the area in inches which each of them presents if cut through their axes, which I think is the true surface which they present to be acted upon by the influences pounds and presents a surface of 3.1416 inches, which the four inch ball, which weighs 13.744 pounds, or eight times as much as the two-inch one, presents a surface of 12,566 inches, or only four times that of the two-inch, making a diminution of one-half the proportionate resisting surface by doubling the diameter of the balls. Consequently I think that the gun of large caliber, carrying a large ball, if the barrel is strong in proportion to the bore, so as to prevent much vibration, must be the best for long ranges.

Chatham, C. W., Jan. 6, 1862. J. D.

Prevention of Spiking Cannon.

MESSRS. EDITORS :—Perhaps there never was a period since time was that so much intellect and ingenuity was expended in expediting "that unprofitable contest of seeing which could do the other the most harm," as at the present, out of which must grow many valuable discoveries and suggestions important to the science of arms. Many will fall stillborn, for the want of ability or energy to bring them to the knowledge of the proper authorities for trial and introduction, or to overcome the attachment of old "covies" and martinets to antiquated theories and prejudices.

Among the many that I observe in your unique and valuable paper, I was struck with the ingenious contrivance of the Paterson gun; not only as a perfect security against spiking, in case of disaster, but the capital manner of firing through a vent in the cascabel (the button or globe at the bottom of the cannon) which is secured into the caliber like the breech pin of a musket, which, in case of abandoning the gun, is taken out almost instantly, rendering it almost impossible to easily disable it, and at the same time rendering it useless to the captors. There must accrue a very decided advantage in boring and rifling a gun that has an open caliber from end to end, admitting light to examine its soundness and the finish and perfection of the spirals.

On reading the description of this improvement, I was led to imagine some method that would prevent the spiking and disabling the present guns by an enemy, in case of capture. I propose that the cannon shall have a three-quarter or five-eighth-inch hole, bored at the proper point and filled with a screw plug, with three or four turns of a strong thread, and the balance plain, with a deep slot to insert a driver, or to be elevated enough above the surface to allow a square neck to apply the wrench, and the vent to be in the center. It could be instantly removed, leaving an orifice too large to be used by the captors, and in case of recapture be immediately put in operating order. If there is no objection that this process would affect the strength of the gun it looks to me as if it would be practicable and unobjectionable. There would be a safety in making a pretty strong countersink in the gun, which the vent plug should fill, and which would prevent an enemy from injuring the thread of the female screw, so that it could not be readily replaced if recaptured—an occurrence that often happens in a hand-to-hand fight. L. B. L.

Rock Oil for Paint.

MESSRS. EDITORS :—You ask some of your correspondents to try and throw some light on the use of benzole in the making of varnish, your request being an addenda to Mr. E. A. W. Jone's complaint, in your issue of Dec. 28. Having made hydrocarbons my peculiar study for some time, allow me, though not one of your correspondents (yet a reader of your paper) to have my say on it. The substance, I suppose Mr. J. refers to, is not benzole but naphthole, which is extracted from rock oil. The two are as different as night and day, though their chemical proportions and appearance are about the same. Pure naphthole is the lightest known fluid and is similar in volatility to ether and cannot be made into nitro-benzole like that which is made or rather extracted from coal tar. It is a pure hydrocarbon and will not mix, as a usual thing, with any other substances than those from which it is taken and then only by the aid of heat. Why it will not, I cannot say, and doubt if a good reason can be assigned. Benzole will mix with varnish. Mr. J. refers to trouble he has had with asphaltum varnish; allow me to suggest to him that the most if not all asphaltum varnish now made, is made with rosin oil naphtha, which like turpentime is not a pure hydrocarbon though classed as such generally speaking and the purer naphthole disdains alliance with the gross fluid, but if Mr. J. will take naphthole and asphaltum and boil them together or boil the asphaltum and pour it into the naphthole he will find the most of it will be dissolved. The gross particles of foreign matter, however, will not be taken up. He then can add linseed oil if he desires. The mixing should be done with a dry coil to prevent explosion, for the naphthole is too inflammable to be trusted near a fire and too volatile for use in an open vessel. Mr. Jones cannot use naphthole in varnishes made with other naphthas or turpentine. If desired I may be able to throw more light on this subject, for naphthole is a very light article. In your last issue you remark about destructive shells, and say that a Mr. Pachman, "patented a shell charged with explosive gases and ferrocyanide of potassum in powder—a powerful poison." There must be an error somewhere for the ferro-cyanide (yellow prussiate) is perfectly innocuous you might say. Was it not the deadly cyanide of potassum, the chemical he used? Again you say that Henry Shrapnell patented the so-called shell in 1834. If so, how happens it that in the war of 1812, an English officer writing from Fort Erie complained that the "Yankees have learned to use Shrapnell shells?" This is his language and the letter was published in the Buffalo *Gazette*. I have not the file of papers by me to give you the exact date, but my antiquarian friend, Mr. Ives, the Librarian of the Young Men's Association, will hunt it down for me; in that library there is a copy of the paper. S.

Buffalo, January 9, 1852.

To Prevent Sandstone from Scaling Off.

MESSRS. EDITORS :—Being a constant reader of your invaluable journal, I noticed in Vol. VI., No. 2, new series, some accounts of deterioration of many of the various kinds of sandstone now in use, and I resolved to give you my experience on the subject. Thirteen years ago, I erected a block of brick buildings, the trimmings of which were, as I supposed, Connecticut sandstone. A few years afterward, while repairing them, I noticed that that the stone in many places had scaled off, and gave evidence of rapid decay. Being a painter by profession, and having had my thoughts on former occasions directed to the subject of porous bricks (which I had never found any difficulty in preventing from absorbing water), I applied the same agent to the stone that I had formerly applied to the bricks, and up to this time, which is seven or eight years, the stone has given no further evidence of decay. My habit in preventing brick-work from absorbing water was to give it a coat of raw linseed oil; as soon as that was sufficiently absorbed, I gave it a second coat, and so on until I had given it about what I thought enough. About three coats given in this way saturated the bricks with oil to about one third of an inch. In thus proceeding, care must be taken not to allow any of the coats to dry until all that is intended to be put on has been applied. G. J.

Boston, Mass.

How to Make Hair-Springs of Watches.

A correspondent residing at Concord, Mass., sends the following account of the method of making watch hair-springs, as invented in England several years since. Our correspondent says, with regard to the inventor :—

He first made a thin barrel, just the depth of the width of his hair-spring wire, and fitted an arbor to it of the size of the hair-spring collets in use at the time. He then sawed this arbor with two slits, at right angles to one another, and parallel to its axis, and bored four holes in the edge of the barrel, opposite the slits in the arbor, when in the barrel. He then inserted the end of a coil of hair-spring wire in each hole in the barrel and into the slits in the arbor, and wound the arbor ro und until the barrel was full. He then cut off the wire on the outside of the barrel, and had four complete hair-springs, made in a minute, all perfect and better than could be made by the old process in hours. This is the story, as told me by a workman of the old country, who worked there at the time of the discovery.

F.

The Astor Library—Resignation of the Librarian.

The Astor Library has become one of the most interesting features of this city. It was founded in 1839, by the late John Jacob Astor, and enlarged by his son, William B. Astor, who is probably the richest man in the United States. The library has been under the superintendence of Joseph G. Cogswell, LL. D., since its foundation, and to his fidelity and learning the public is greatly indebted. We regret to say that he has felt himself compelled by the pressure on his physical powers of advancing years to resign the station which he has filled with so much honor and success. In September last Dr. Cogswell brought to a final close his arduous undertaking of preparing the catalogue of the library, filling four massive volumes of 2,110 pages, accurately arranging in alphabetical order the titles of all the volumes—nearly 120,000 in number—now on the shelves, and of which every syllable and letter underwent his personal and careful inspection.

We understand that Francis Schroeder, Esq., late of Rhode Island, and former *charge d'affaires* from the United States to the court of Sweden, a gentleman of fine literary culture, extensive knowledge of books, and courteous and attentive manners, is appointed by the trustees to fill the vacancy.

A SIGNIFICANT FACT.—Prof. Henry, the distinguished *savan*, and head of the Smithsonian Institute, testifies that he knows but one man among the scientific men of the United States who is an infidel. This fact speaks volumes, and shows conclusively that the lights of science have any other tendency than to make men skeptical or unbelievers. It is usually your pretenders to scientific knowledge, or men wholly destitute of any scientific attainments, who disbelieve, or affect to do so. As a general remark, we think it will be found that a vast majority of them belong to the latter class, being wholly ignorant, or, what is worse, mere smatterers.

A FREE bridge has been completed over the Mississippi river, connecting the towns of McGregor and Prairie du Chien.

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Light and Deep Draught Steamers.

The following interesting remarks on this subject are from *Mitchell's Steam Shipping Journal* :—

We gave in a recent number a paragraph from a New York journal, suggesting the sending over to the river Thames one of the American coasting steamers. The *Metropolis* was the steamer named; but a correspondent, whose letter we gave, advises one of the newest ships of that class to be sent, as her presence here would be the great hit of the Exhibition year 1862. He informs us that two new coasting steamers were commenced in 1860. These boats are 500 feet in length, 37 feet beam, 12 feet depth, and 6 feet draught of water, with first class accommodation for 1,000 passengers. A vessel of this sort in our great metropolitan stream would be a novelty second only to the *Great Eastern*. We see no reason why one of these long boats should not cross the Atlantic. They fall in with heavy weather, and inshore ground swells, on the American coast, and they are fine dry vessels in a seaway. The *Hankow* of 220 feet in length, beam 31 feet 6 inches, and depth 11 feet, built for the Canton river, made an excellent run from New York to China, and proved herself in heavy gales to be a safe and seaworthy ship, though built for river service. Then we have the *Stanley*, which left England for India, and rode through a violent gale, lifting easily to the seas. If the Americans favor us with a sight of one of their 500-feet steamers on the Thames, it may lead to curious and unexpected results. Already there is a subscription list opened, to back an American steamer against any British steamer for a round sum of money, and if there is a grand steamship race next year, the excitement will be intense. The yacht *America*, by filching the laurels from our yachting gentry, led to a reformation in the build of those vessels, and, should the American coasting steamer beat the fastest boat pitted against her, we may have a revolution in our style of shipbuilding. We may not piratically imitate the American steamers, but by blending their good qualities with our existing mode of construction we may, perchance, turn out a new description of steamship. The vessels of 500 feet laid down in 1860, are to attain a speed of twenty-three miles per hour. Our river boats are all built for very short trips, and are not required to possess the large passenger accommodation on board the American river boats: and as length adds very materially to a vessel's speed, we have no boat at all approaching their dimensions to run in fair competition with them. To afford both sides a chance there should be a race also between small steamers of the same tunnage. British rivers are mere rivulets compared to the inland rivers and lakes of the American continent. Look at the Mississippi. Steamers leave New Orleans for St. Louis, a distance of 1,600 miles. The boats on this mighty river are in keeping with its navigation. There is the steamer *Eclipse*, 365 feet in length, which carries 7,000 bales of cotton, and has gone over the 1,600 miles up against the stream in three days, four hours; or an average of twenty-one miles an hour. The *Natchez*, another Mississippi boat, takes 6,000 bales of cotton, and has cabins for 300 passengers. The Americans aim to secure a shallow draught both for river and ocean steamers, and by this means get high average speeds. That we shall have to ingraft this system on our styles of shipbuilding there can be no doubt.

The Dublin and Holyhead packets are the first of a new class of large steamships with light draught driven at high speed, and they cross the chopping seas of the Irish Channel in all weathers with punctuality and safety. We have only to push the system to steamers for long voyages, and we shall reduce very considerably the time now spent at sea in good strong ships, but constructed on a wrong principle as steamers, though excellent as a combination of steam and sailing ship. What the correct proportions for ocean steamers ought to be is left for practical exemplification.

Who is Not a Physician.

The following anecdote is related by the Paris correspondent of the *Lancet*, (*Med. Critic and Psychological Jour.*) The late M. Ferrus, on one occasion being a guest along with sundry literary and scientific celebrities at the house of Alibert, and the conversation having fallen upon the trades and professions of France, asserted that of all professions medicine was undoubtedly that which was most followed, not only in Paris, but in all countries. Every one dissented, and Alibert foremost of all. "Why," said he, "there are not a thousand doctors in Paris, and some villages in the provinces have no doctors at all." Ferrus, apparently silenced by the overwhelming majority against him, ended by saying that he was sure that the company would ere long find that he was right. In the course of the evening, throwing himself into an arm-chair, and burying his face in a handkerchief, he began to groan most piteously. In an instant he was surrounded by the whole party, who sympathizingly inquired the cause of his distress. "A violent toothache," was the answer. "Go home, and gargle with warm milk," said one; "Put a little cotton-wool steeped in laudanum into your ear," said another; a third recommended a poultice of boiled figs; a fourth a stockingful of hot sand; a fifth (and this no less a person than Humboldt) the repetition of some charming couplet which Brazier had just sung; and so on until each of the company had recommended some infallible recipe. When the last of the panaceas was exhausted, Ferrus, throwing away his handkerchief, and desisting from his grimaces of feigned agony, burst into a hearty laugh, saying, "Well, was I not right? You are all doctors, and have each furnished me with a prescription. In France no one believes in medicine, and yet each one is a physician. Will you still venture to deny that my assertion was correct?"

To Detect Explosive Coal Oil.

Many disasters being already occasioned by the use of explosive coal oil, the following receipt for ascertaining whether or not the article is explosive, may not be out of place:—Pour a small quantity into a saucer, and bring a lighted match slowly down to it. If explosive, the oil will blaze and flash up almost like powder; if not explosive, it will not burn at all. The latter only is safe for use.—*Phila. Ledger.*

[The cause of explosion in all such cases is due to the oil assuming the gaseous condition by evaporation, and mixing with about eight volumes of the atmospheric air. The evaporation of the air is dependent upon the temperature of the room, and the extent of surface over which it is distributed. The very light coal and rock oils should be used with great caution for burning in lamps, as they are fully more volatile, and equally as dangerous as the old explosive lamp mixtures of alcohol and turpentine. The burning oils which are most commonly used now, are of a much lower specific gravity, than those that were in common use about eighteen months ago. They are quite cheap, clear, free from the fetid smell of old coal oils, and are not so liable to smoke; but these qualities are obtained at the expense of durability—one pint of the old brandy colored oil having given as much light as a quart of the clear light oil.—EDS.

Curious Cases in Surgery.

The London *Lancet*, tells the following stories:—"A woman came to the hospital in May last, about five o'clock P. M., and stated that she had had her nose bitten off by another woman about an hour previously. She brought the piece with her; it was quite black, and covered with dirt. However, Mr. Slater washed it in warm water, and carefully sewed it on again with silver wire. In a fortnight it was perfectly attached, and had been adjusted with such accuracy that one could scarcely tell she had ever lost her nose.

A man entered the hospital in March last, and stated that he had had three of his teeth knocked out in a fight. On examining his mouth, it was found that he had lost his three upper incisors, which he brought with him. Mr. Slayter tied them in with silver wire, and in ten days two were quite tight; the other would not stop in.

In April last a man came to the hospital and showed Mr. Slayter a piece of his own scalp, about the size of a five-shilling piece, which he stated had been knocked off by a quart pot in a fight. It was sewn on, and in less than a fortnight it was perfectly united.

WHILE all the cotton mills at Adams, Mass, were stopped during the holidays, the whole of the woolen mills in that place had to be run to fulfill government contracts.

Tea---Theine.

Tea is said by persons familiar with the subject to be a chosen beverage of one-half of the human race, being drunk by 500,000,000 people. The peculiar principle of tea is a substance called *theine*. About three pounds of this substance are obtained in 100 pounds of tea. When taken into the human system it excites the brain to increased activity and soothes the circulating system, so that it prevents too rapid a change of the materials of the body, and thus economizes food. It is to this effect that the value of tea as an article of diet chiefly depends. Should tea, however, be taken too largely it acts injuriously producing trembling of the limbs, irritability of temper, and even wandering of the mind; these symptoms are produced if as much as one ounce of tea (which contains about eight grains of theine) be taken in a day. It is said that when these annoyances have been produced by a continued excess of tea, it is desirable to have recourse to cocoa for some days, when the irritable symptoms rapidly subside, and the use of tea may be resumed, care being taken to employ it in moderation. The evil effects of inordinate tea drinking do not at all detract from its utility when taken in due moderation. The circumstance that all nations, removed but one degree from absolute barbarism, employ some unintoxicating and unfermented beverage, is of itself a sufficient proof that there is in the human system a positive want of some such article of diet; and the singular fact that all the materials so employed, of which the most important are tea, coffee, chocolate, and the peculiar substance termed maté or Paraguay tea (of which about 8,000,000 lbs. are annually consumed in South America), contain a peculiar and almost identical crystallizable substance, similar to theine, confirms this supposition.

A CALIFORNIA PATENT.—Gilbert M. Cole, of Folsom, California, has just received from the United States Patent Office his Letters Patent for an improvement in the mode of turning locomotives. The nature of the invention consists in attaching to the turntable a small pair of steam cylinders. Steam is to be communicated to the steam cylinder from the locomotive, when on the turntable ready to be turned, by means of a pipe leading from the dome or stream chamber of the locomotive to a point at the rear end of the locomotive, which will then be at a central part of the turntable and convenient to be attached to the pipe leading to said cylinder. The work of turning turntables has heretofore been done by other power, and principally by man power. There is also patented the combination of the great segment cog-wheel, and the track upon which the wheels of the turntable roll.—*Sac. Union.*

IRON MASTS.—We take the following from *Mitchell's Steam Shipping Journal:*—"The iron masts and bowsprit for the iron steamer *Defence*, 22,600-horse power, which have been forged at the Thames Ironworks Company, arrive at Chatham on the 23d of December. Each mast is of great apparent strength, the weight of the lower mainmast and fittings being sixteen tuns, that of the foremast fifteen tuns, and the mizzenmast six tuns, five cwt.; the iron bowsprit, which was landed on the 26th, weighs exactly four tuns fifteen cwt. On the occasion of Rear.Admiral Sir F. W. Grey (one of the Lords of the Admiralty) and Rear-Admiral Robinson (Controller of the Navy) visiting Chatham Dockyard, they urged the completion of the *Defence* by the earliest possible period, and expressed their regret that she was not likely to be in readiness till the middle or end of January, instead of the commencement of December, as had been originally intended."

TO PURIFY BENZOLE FOR MAKING VARNISH.—A correspondent, T. A. Hoffman, of Beardstown, Ill., informs us that asphaltum dissolved in common benzole makes very excellent varnish. He also states that the benzole usually sold in the market contains oxygen, while pure benzole does not contain this element. In preparing common benzole for making pal varnish, by dissolving this gum (resin), he advises that about 1½ per cent of fresh-burned unslacked lime in powder be added to the benzole and the vessel holding it shaken occasionally for a few hours, when it should be allowed to stand still for twelve hours, and the clear ether drawn off. The lime absorbs the oxygen, leaving pure benzole for acting upon the gum resin to dissolve it.

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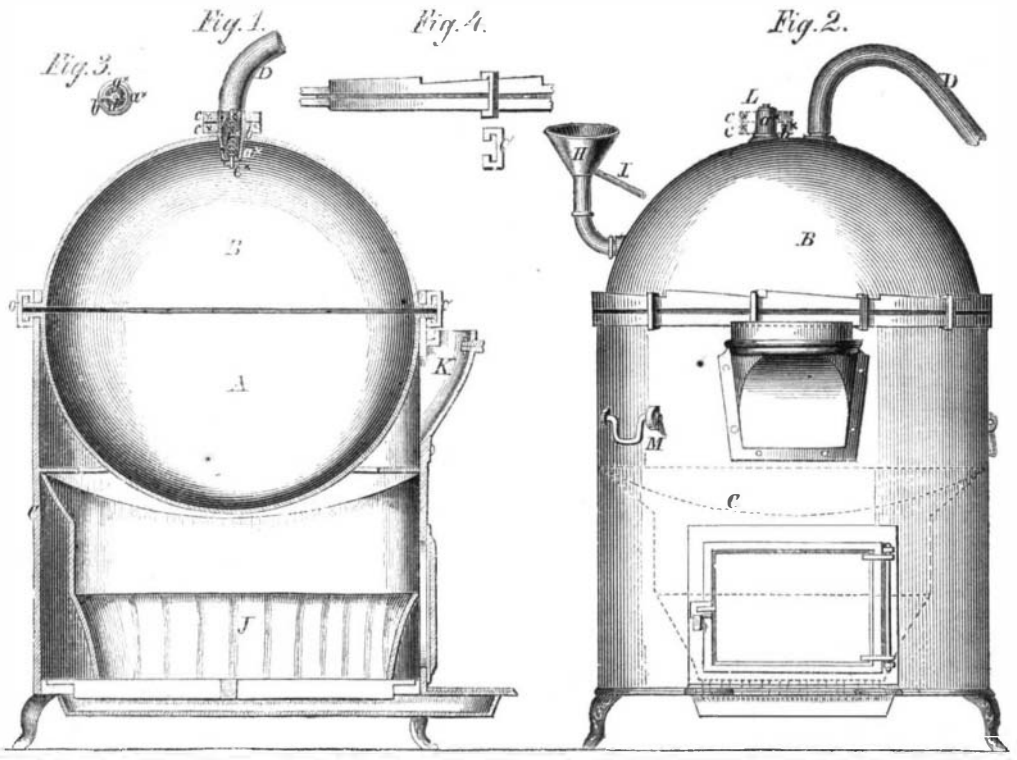
An Improved Farmer's Steam Boiler.

All farmers find it good economy to cook food for their stock, and many find it advantageous to use steam for cooking roots in wooden vessels and for other purposes. The accompanying engravings represent an apparatus which may be used either as a boiler or as a steam generator, and which may be readily converted from one to the other as occasion may require. The boiler is a hemispherical kettle, and it is converted into a steam generator by placing over it a hemispherical cover ; the invention relating principally to the mode of securing the cover to the boiler and of packing the joint between the two.

The boiler, A, Fig. 1, has a flange cast upon its edge extending horizontally outward, and this flange has a lip upon its edge turned downward. A similar flange with a lip similar, but longer, is cast upon the edge of the cover. The cover is placed upon the boiler, with a flat ring of india rubber or other suitable packing between the flanges, and then the two flanges are drawn firmly together and secured by a number of clasps, *a* (see Fig. 4). The lip upon the flange of the cover is varied in width, forming a series of wedge-shaped sections, as shown clearly in Fig. 4, and the clasps, *o*, are made of such size that they may be slipped over the narrow portions of this lip, but will firmly gripe the wider portions when driven upon them. This mode of securing the cover obviates the necessity of piercing the packing ring with a number of holes which would be necessary if the cover was secured by bolts and nuts in the usual manner. It is very simple and effectual, and is easily and conveniently applied.

The boiler is supported by its flange upon a cylindrical furnace, C, which is formed of boiler plate and is provided with a fire box, J, chimney, K, handles, M, and legs ; making the apparatus portable, and requiring no masonry setting to fit it for use.



PRINDLE'S COMBINED BOILER AND STEAM GENERATOR.

In the upper part of the cover is placed the safety valve, L, which is a combined vacuum and pressure valve. A tube, a°, provided with a flange, b°, rests upon a ground surface on the cover steam tight. This tube may have weights, c° c°, resting upon it corresponding with the pressure required in the generator The lower end of the tube, a°, is closed by a puppet valve, *e*, the stem of which rises up through the axis of the tube and is sustained by a spiral spring, f° ; the tension of this spring being regulated by a nut, *y*. In case of a partial vacuum occurring in the generator sufficient to overcome the force of the spring, f°, the valve, c°, will be opened and the air admitted, If, on the other hand, the pressure of the steam rises high enough to overcome the pressure of the weights. c° c°, the tube, a°, will be raised, and the steam will escape.

Water may be fed into the generator through the pipe, H. If deemed advisable, the annular trough around the boiler, formed by the lip on the flange of the cover, may be kept full of water by a drip-pipe, J, leading from the pipe, H.

This invention is secured by Letters Patent both in this country and England ; the English patent having been procured through the Scientific American Patent Agency, May 7, 1861. Further information in relation to the matter may be obtained by addressing the inventor, Daniel R. Prindle, at East Bethany, N. Y.

WHEAT contains potash in the form of a phosphate. Neither alumina nor sulphur are found in the ashes of burned wheat, but they are often found in bread, thus showing that the bread has been adulterated with alum.

Important Facts about Rock and Coal Oils.

At a recent meeting of the New York Insurance Companies resolutions were passed declaring petroleum, rock oil, in a crude state uninsurable except when stored in detached and properly ventilated sheds and warehouses, specially adapted by their construction for that purpose, and devoted exclusively to the storage of such oils, or substances of a similar character, and then at a special rate of not less than three per cent. It was further resolved that benzine, benzole, and naphtha, when kept in quantities of three barrels or less, be classed as "specially hazardous," and charged as such ; and when kept in larger quantities than three barrels be subject to the same restrictions and rates as crude petroleum, rock oil and earth oil, and that manufactured coal oil, refined petroleum oil, kerosene and carbon oil, and all oils manufactured from coal, rock or earth oil, and petroleum, when kept in less quantities than ten barrels, be classed as "extra hazardous ;" and when kept in larger quantities than ten barrels, be classed as "specially hazardous," and charged as such.

The rock-oil business is of great importance and magnitude, and it is continually increasing. Suitable buildings should therefore be provided for storing it in New York and other places, when it is kept in large quantities. It injures all merchandise that is brought into contact with it, and it therefore requires to be carried in special cars on our railroads and kept in special fire-proof stores in cities.

Cause of Milk Sickness.

The American *Stock Journal* states that Geo. Fisher has communicated an article on the above subject, on which he asserts that milk sickness is caused by cows eating the *cicuta*. He says the *cicuta* has large, fleshy roots, from which the stem is easily detached. The cattle in dry times resort to these springs for drink, and tramp off the roots, which decay, and impart their poisonous substance to the water ; the impressions made by the cattle's feet in the wet land, become filled with water, and they drink this water, saturated with decomposed *cicuta* roots ; death or disease of some kind must inevitably follow. On cultivated grass, or prairie land, the roots of the *cicuta* are imbedded in the turf, and will not come up by taking hold of the top. The top contains but little poison, and the cattle are seldom injured by feeding in the cultivated land, or in the prairies. In woodland, where it is wet or moist, the *cicuta* is found with its roots slightly covered with rotten leaves and light earth ; these are extracted readily, and are eaten with the tops by the cattle, and this must produce sickness or death.

An Engineer Sold for $3,750.

When Mr. Telford had occasion to visit London on business, during the early period of his career, his quarters were at the Salopian Coffee house, now the Ship Hotel, at Charing cross. It is probable that his Shropshire connections led him in the first instance to the "Salopian ;" but the situation being near to the Houses of Parliament, and in many respects convenient for the purposes of his business, he continued to live there for no less a period than twenty-one years. During that time the Salopian became a favorite resort for engineers ; and not only Telford's provincial associates, but numerous visitors from abroad (where his works attracted even more attention than they did in England) took up their quarters there. Several apartments were specially reserved for Telford's exclusive use, and he could always readily command any additional accommodation for purposes of business or hospitality. The successive landlords of the Salopian at length came to regard the engineer as a fixture, and even bought and sold him from time to time with the goodwill of the business. When he at length resolved, on the persuasion of his friends, to take a house of his own, and gave notice of his intention of leaving, the landlord, who had but recently entered into possession, almost stood aghast. "What ! leave the house?" said he "Why, sir, I have just paid £750 for you !" On explanation it appeared that this price had actually been paid by him to the outgoing landlord, on the assumption that Mr. Telford was a fixture of the hotel ; the previous tenant having paid £450 for him; the increase in the price of this remarkable fixture marking in a very significant manner the growing importance of the engineer's position.—*Lives of the Engineers, by Samuel Smiles.*

Danger of Some Waters for Steam Boilers.

A paper was lately read on this topic, by Prof. Bolley, before the London Chemical Society. He stated that waters containing the carbonates of lime and magnesia were considered better adapted for feeding steam boilers than those containing sulphate of lime. It had been laid down by several authorities that waters containing the carbonates were not so liable to form incrustations as those containing sulphates. This Prof. Bolley had found, was a mistake. Water containing no sulphates whatever had, to his knowledge, formed an incrustation so thick on the inside of a boiler that the metal became red hot from the action of the fire. Upon examination, a small quantity of grease was found in the boiler, and this prevented the water from wetting the scale, hence the fire exerted its action on the metal and raised it to a dangerous red heat. It is therefore dangerous to permit grease to enter a boiler that is supplied with hard water. A little carbonate of soda added to the feed water of a boiler into which some grease may have found access, will help to render it soluble and also soften the scale. Common clay added to the feed water of a boiler containing carbonate of lime, will tend to prevent the deposition of scale.

WATER containing one part of glycerine to every six, by measure, boils at 218° Fah. Equal parts of glycerine and water boil at 230° Fah. Six parts of glycerine and two of water boil at 250° Fah.

A GOOD transfer paper may be made for copying monumental inscriptions and metallic patterns by rubbing a mixture of black lead and soap over the surface of common silver paper.

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VOL. VI. NO. 4.....[NEW SERIES.].....*Eighteenth Year.*

NEW YORK, SATURDAY, JANUARY 25, 1862.

THE DEFENSE OF OUR HARBOR—PROMPT ACTION NEEDED.

In case of a war with England or France, the first point of attack would doubtless be New York city. If a hostile fleet should succeed in passing the fortifications of our harbor we might reasonably expect such treatment from the enemy as was shown to the people of Paris at the time it was taken by the Allies. When the Allies entered that city after the fall of Napoleon, Blucher demanded of the city government the immediate payment of £4,000,000, under the penalty of permitting the place to be sacked by the soldiers, and over $300,000,000 was exacted from France by the several powers who were leagued against that nation. This was in retaliation of the military contributions wrung by Napoleon from Berlin, Vienna and other cities, when they were in his power. With a great hostile fleet in our harbor all the wealth of our citizens would be at the mercy of the commanding commodore, as he would hold in his hands the power of burning the place.

The forts built at the entrance to this harbor were designed to defend us against the vessels in existence when these works were planned; and, being constructed with intelligence and skill, are doubtless entirely efficient for this purpose. But the introduction of iron-plated ships exposes us to attacks for which these forts were not provided. It is the opinion of very intelligent engineers that a fleet of these vessels could sail up the narrows with perfect impunity. Targets constructed like the sides of these ships have been fired at by guns similar to those in our forts, and they have endured a cannonade greater than that to which they would be subjected in entering our harbor.

But the power of a ship to resist a projectile hurled against her depends entirely upon the weight of the projectile. In all the elaborate and costly experiments of the English government upon iron-plated vessels and targets, the heaviest shot that we have seen mentioned is an Armstrong bolt of 200 pounds. Now a ship's side might resist such a shot without a fracture, when it would be crushed like an egg shell by a shot of 400 lbs. weight.

After a long series of experiments the ordnance officers of our army have succeeded in casting perfectly practical and durable artillery which will carry balls of 425 lbs. in weight. What the effect of such missiles upon iron-plated ships would be has never been ascertained. That it would be far greater, however, than that of shot one-half the size there can be no doubt. Our most intelligent ordnance officers are of opinion that any iron-plated ship in the world exposed to the fire of a few of these guns would be very quickly demolished.

The Secretary of the Navy would doubtless order the light guns in our forts to be removed and their places to be supplied by heavy pieces were it not for the multiplicity of affairs requiring his attention. Would it not be well for our city government to take the matter in hand. We have in our office a copy of Capt. Rodman's reports, giving minute directions for mixing the ores and casting his 15-inch guns; the proprietors of our foundries would be very glad to take the contracts, and in a few weeks the forts in our harbor might be bristling with artillery so formidable that we could bid defiance to the iron-clad navies of the world. The general government would doubtless refund any advances made for this purpose, but even if it did not, the outlay would be trifling, compared with that which would follow the anchoring of a hostile fleet in our harbor. Let our new Mayor direct some of his energy to this subject, and it is not very improbable, in the complications with which the country is constantly threatened, that he may have the satisfaction of saving the city from destruction.

DEATH OF SAMUEL COLT, THE INVENTOR.

Another prominent man has departed from among the living. Col. Samuel Colt, inventor of the revolving fire arms, died on the 10th inst., after a few days' illness, at his native place, Hartford, Connecticut. He was one of New England's most energetic men. From being a poor boy with a very moderate education he carved his way upward to wealth and renown. He was born in Hartford on the 19th of July, 1814, and was therefore only 47 years of age at his decease. It has been stated that he was wild and unruly in youth, and that when he was fourteen years of age he ran away from school and shipped as a sailor boy on a vessel bound to Calcutta in the East Indies. One voyage cured him of a desire for a "life on the ocean wave." On his return from Calcutta he served a brief apprenticeship, and learned the art of dyeing, in a factory at Ware, Mass., where he acquired considerable knowledge of practical chemistry. When he left this situation, he assumed the title of Dr. Colt, and traveled through the United States and Canada, giving lectures on chemistry in the various cities and villages. Becoming tired of this wandering profession, and having acquired a considerable amount of money by his lectures, he settled down to commence the active life of an inventor and manufacturer. The first thing which he did to this end was to complete a working model of his revolving pistol, the idea of which was first suggested to his mind while on his voyage to the Indies. The next step in his career (and a most wise one) was to take out patents, not only in America, but in France, England and some other European kingdoms. This was in 1835, when he had completed his twenty-first year, at which time he also succeeded in organizing a company with a capital of $300,000, for the purpose of carrying on the manufacture of his revolvers at Paterson, N. J. This turned out to be an unsuccessful undertaking, as the company suspended in 1842. But, although Col. Colt was discouraged, he was not dismayed. He waited patiently for the hour of success; and at last it arrived, in 1847, during the war with Mexico. Gen. Taylor had obtained and used a revolver pistol during the war with the Indians in Florida, and, knowing its value, he sent Captain Walker, of the Texan Rangers to New York to obtain a supply of pistols for the officers in his command. Not a single revolver, however, could then be obtained. Upon application to Col. Colt, he undertook a contract to supply 1,000 pistols for the army, and hired a machine shop, temporarily, at Whitneyville, Conn., to execute his order, which he finished with satisfaction to the government. From this time forth the career of Col. Colt was one of business prosperity. Orders flowed in upon him thick and fast, and he finally purchased a tract of land at Hartford, erected an armory, and commenced manufacturing revolvers upon an extensive scale. The land, buildings and machinery of his armory at Hartford cost, from first to last, about $1,000,000. The fame of this armory has become world-wide, as much on account of the superior machines employed to fabricate the different parts of revolvers, as from the character of the arms themselves. Like most manufacturers who have achieved success, Col. Colt set out with the wise determination to employ the best talent, and use the best machinery that could be devised, for facilitating and perfecting the various operations connected with his peculiar manufactures.

In 1851, he visited the World's Fair, and for the first time learned that firearms having rotary breech-chambers were about two centuries old. One of these, made in the reign of Charles I., was in the United Service Museum, but it did not possess the improved device for rotating the chamber and operating the hammer by pulling the trigger. At the request of several distinguished persons, Col. Colt prepared a paper on revolving firearms, which was read before the United Service Institution, in which he explained the operations of the old revolvers, and pointed out the superiority of his own. This lecture was well received, and it led to the revolver becoming a favorite with the officers of the British Army. In the wars at the Cape in South Africa, in the Crimea, and in India, every officer engaged carried a revolver. There is now a large manufactory of such pistols in London and another at Tula, in Russia. Colt's revolvers are of world-wide reputation. Perhaps there is not an officer in any army in Europe, and not one in America, who does not carry one of these destructive implements of war.

Col. Colt did not confine himself to one subject. He had a prolific mind, and as far back as 1843 he made experiments in New York with submarine infernal machines; and, with a galvanic battery situated in the Merchants' Exchange, Wall street, he succeeded in blowing up a sunken hulk down in the Bay. The submarine cable used on the occasion was a metal wire covered with cotton and wax, incased in a lead tube.

All the parts of the revolver firearms, likewise, balls, cartridges, molds and other accessories are manufactured at Colt's armory by special machines, invented for the purpose, and secured by many patents. The facilities for making pistols are so excellent that about 60,000 were made annually before the war commenced; but during the past year this number was more than doubled. Many of the machines used were invented by Col. Colt; others by able mechanics in his employment. It is to his credit that, with increasing wealth, his solicitude for the welfare of his operatives also increased. A public hall, a library, courses of lectures, and a series of concerts were maintained for his workmen.

The immediate cause of his death is supposed to have been an excess of mental labor arising from the demands made upon him to execute orders for the war, together with other pressing cares connected with the distracted condition of the country. He has gone where "the weary are at rest;" but his name connects with the fame of his revolving firearms will go down to other generations.

TRIAL OF WARLIKE INVENTIONS.

One of our cotemporaries, in alluding to the important part that inventive genius has played in this rebellion, says, "There appears to be a very general complaint among inventors who have new war machines to test that our government is far behind those of Europe in affording the proper facilities to test new inventions." Whoever will look over the columns of the SCIENTIFIC AMERICAN for the past twelve months will be forcibly reminded of the fecundity of our inventors in supplying inventions of a warlike character. Many of them are of greater or less importance to the government, while some of them contain the germs of great destructive power. Now, in order to render these inventions available to the national cause, the skill of the practiced armorer and the supervision of the ordnance officer are required. It is true a good deal has been done by Captain Dahlgren and other competent government officers to perfect the results at which the inventor sought to arrive at the outset, but it is impossible for these officers, however well disposed, to do very much toward conducting experiments while the actual wants of their respective departments are so pressing. A commission, composed of competent and reliable men, could accomplish great good, not only for government, but also for the inventor. We are ready to match the inventive genius of this country against that of any other nation, and if government could contrive some feasible plan to encourage it, in strengthening the military and naval power of the country, the result would be a more effective war enginery than that possessed by any other nation. Our inventors have always proved themselves equal to any and all emergencies. They ask only a fair chance to try their inventions, which, for lack of means, they are frequently unable to do. It is true many ridiculous and crazy schemes would be proposed, but a board of competent officers would be able to reject them, without need of experiments, to prove their worthlessness.

We are almost afraid to suggest anything of this kind. We shrink at the thought of multiplying offi

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ces under government. There is so much rascality connected with official duty that it is a habit to think that every office holder is, perforce, a scoundrel.

WATER AS A DISINFECTANT.

There are two classes of disinfectants. By one class offensive odors are destroyed, by the other they are simply absorbed. Of the the latter class the most powerful and universal disinfectant is charcoal. So far as we now recollect there is not a single substance which on being filtered through charcoal will not be deprived of its flavor and odor. Spirits distilled from various fruits and grains are mingled with volatile ethers which give them the flavors of the peach, apple, grape, rye, wheat; &c., from which the spirits are made. But if the liquor is filtered through charcoal, its flavor is removed, and it becomes rectified spirits—tasteless and inodorous alcohol and water. It seems to be the nature of all those delicate compounds which affect our olfactory nerves to nestle into the minute pores of charcoal, and to cling there with great tenacity.

The substance coming next to charcoal in its power of absorbing various odors is water. Water absorbs its own volume of some gases, and more than six hundred times its volume of others varying as shown in the following table:—

One cubic foot of water absorbs of	*Cubic feet.*
Sulphurous acid gas	43.78
Sulphide of hydrogen	2.53
Carbonic acid	1.06
Nitrous oxide	0.76
Oxygen	0.65
Hydrogen	0.46
Hydrochloric acid	480.00
Ammonia	670.00

The volumes given are those which water will absorb at a temperature of 64.4° Fah. except the last two, for which the temperature is 50°.

The offensive odors most frequently encountered are those of ammonia, and the sulphide of hydrogen, both being always produced by the decay of animal matter. The power or water to absorb these gases prevents meat decaying in a large body of water, the carcass of a horse in the harbor, for instance, from giving off any odor.

The power of water to act as a disinfectant can be made available in many circumstances; it is especially useful in chambers of the sick, as a dash of water in any vessel standing in the room will render it inoffensive.

MILITARY TRAINING IN COMMON SCHOOLS.

Messages of governors to legislatures, articles in the papers, pamphlets, circulars, and general conversation indicate clearly that military training is to be extensively introduced into our common schools. The thing that we have to say in regard to the measure is, that we hope the time for this military drill will be taken from the hours devoted to study—not from those given to play. Children are required to sit at their desks through periods altogether too protracted. One hour is quite as long as any child should be confined at study, and if the wearisome and exhausting drain upon the brains of the pupils in our schools can be broken up into shorter sections by intervals devoted to practice with arms, we have no doubt that the reform will be quite as perceptible in the more rapid advance of the children in their studies, as it will in the better development of their physical systems.

RESIGNATION OF THE SECRETARY OF WAR.

Gen. Cameron, Secretary of War, has resigned his office, and has been appointed by the President Minister to Russia, in place of Cassius M. Clay, who asks permission to return home, in order that he may have a hand in the war. Hon. Edwin M. Stanton, of Pittsburgh, has been appointed Secretary of War. Mr. Stanton is an eminent lawyer, and a man of marked ability. He is a Democrat in politics, and was Mr. Buchanan's Attorney General in the last few months of his administration, and, together with Mr. Holt and Gen. Dix, saved it from utter ruin, and the City of Washington from seizure. It is said that the President appointed Mr. Stanton out of compliment to the loyal democracy, who are so earnest in their support of his administration. If this be true, it shows that the President rises far above his party, and goes for the salvation of his country. We can honor such motives. They are patriotic.

LEARNING TO SHOOT—WESSON'S BREECH-LOADING RIFLE.

Partaking of the war spirit which has become so general among all classes of our people, we not long ago procured a rifle, and commenced to practice as we had leisure and opportunity. Being but a novice in the use of firearms, the first thing to be done was to select the kind of rifle to be used in practice, and after examining the various kinds we finally chose the Wesson breech-loading rifle, an engraving of which may be seen on page 8, Vol. V. Scientific American. After several months' trial we are so well pleased with our choice that we have no hesitation in recommending it to any person who enjoys the sport of target practice or the wilder sport of game hunting. The cartridges are water proof, and combine ball and cap, neatly enveloped in a copper case, so that all the operator has to do in loading is to touch a spring, and the muzzle of the barrel drops down by its own weight, and elevates the breech to admit the charge. While in the act of raising the gun to the eye, the barrel is brought to its place, and caught and rigidly held by the spring until discharged and then released for reloading. The mechanism of the lock is as simple as that of an Enfield rifle, and not more likely to get out of order. An experienced rifleman can load, take aim and fire accurately as many as 12 or 15 times per minute. The length of barrel is 24 inches, and the whole weight of gun only 6 pounds, size of bores $\frac{22}{100}$ths, $\frac{32}{100}$ths and $\frac{36}{100}$ths of an inch. The cartridges are supplied on reasonable terms by the single hundred or ten thousand.

The agent in this city is J. W. Storrs, at No. 256 Broadway.

RISE IN THE PRICE OF COTTON GOODS.

When the Confederate States formed their league last spring, and the political horizen became clouded, most of our manufacturing companies purchased large quantities of cotton, in anticipation of the supply being curtailed. All who purchased largely then have made immense profits by the rise in the prices of cotton goods. Fine Lowell brown sheeting, 37 inches wide, which sold last may at 8½ cents per yard, wholesale, now sells at 12½ cents. Stout brown drilling, 30 inches wide, which sold at 8¾ cents per yard, now sells at 16 cents, which is an advance of 47½ per cent in the former case, and 83 per cent in the latter. The average rise in the price of plain cotton goods is 65 per cents. The rise in prints has not been so great as in plain goods; the average being 47 per cent. As most of the stock of cotton which was on hand, has been worked up, a dearth of this material stares our manufacturers in the face, as the prices of it have risen from 8 and 12 cents per lb to 36 and 40 cents, and lately small quantities have been imported from England. It is estimated that there is not a stock of cotton on hand to keep our factories running two months. What then is to be done when this is all worked up? This is now a subject of serious thought to our cotton manufacturers. The Lowell *News* states that large orders for cotton have just been sent to England.

THE BOTTLE LAW UNCONSTITUTIONAL.

An act was passed by the New York Legislature, on March 24, 1860, giving the right to every dealer in mineral waters to stamp his bottles, and by filing a description of them in the office of the County Clerk or Secretary of State every other person was prohibited from filling, selling or purchasing such bottles without the consent of the owner. The law also authorized a search warrant to be issued upon oath of the owner to search premises for such bottles, and every such bottle found upon search subjected the party accused to a fine of fifty cents for the first, and five dollars for every subsequent offense. On the 13th inst., Judge Sutherland, of the Supreme Court, in the case of an appeal from a District Court, decided that this law was unconstitutional—null and void—opposed to the principles of justice and common law.

Our thanks are due to F. W. Seward, Esq., Assistant Secretary of State, for copies of correspondence of the State Department with our foreign Ministers; also for a pamphlet containing the correspondence relative to the Mason and Slidell affair.

THE CHEMISTRY OF COAL.

Number 1.

A GENERAL VIEW OF THE SUBJECT.

The science of chemistry naturally divides into two departments, organic and inorganic chemistry. Plants and animals have organized structures, and the study of their composition is, therefore, called organic chemistry. All organized bodies are composed principally of four elements, oxygen, hydrogen, nitrogen and carbon. All of these substances, when in combination with each other, or with other elements, exist in the solid, the liquid and the gaseous form; but when isolated, three of them, oxygen, hydrogen and nitrogen are encountered only in the gaseous state, while the fourth, carbon, is known only as a solid, or if ever evaporated it is only at the carbon points of a galvanic circuit.

We have now on the table before us a piece of the nitrate of ammonia, which is composed wholly of the three elements, oxygen, hydrogen and nitrogen. It is a white, solid substance, looking somewhat like saltpeter, though not quite as hard, with a bitter, salty taste. If gradually heated it disappears, being decomposed into invisible gases. There are many other substances, liquid and solid, composed of the three organic gases; and they may all be decomposed, when, of course, they vanish like the imaginary creatures of superstition.

Coal is an organic product, having once existed in the form of moss. All vegetables, besides the four organic elements, contain small quantities of nine or ten inorganic elements. These form the ashes when wood or other organic substance is burned. Only two of them exist in vegetables in any considerable quantity; these are the alkaline metals, sodium and potassium, in combination with oxygen, forming soda and potash. Soda is a constituent of marine plants, and potash of land plants.

All organic substances are decomposed by heat, when the gaseous portions float away in the atmosphere, and the solid parts remain behind. The inorganic substances and the carbon are solid. If wood is heated under circumstance in which it is excluded from the action of oxygen, the oxygen, hydrogen and nitrogen which enter into its composition are driven away, and only the inorganic substances which form the ashes and the carbon remain as charcoal. The moss from which mineral coal has been formed has also been decomposed, either by heat or by some other of the forces of nature, and part of its gaseous elements have been driven off, leaving the carbon and the ashes behind. The proportion of the gaseous elements expelled depends upon the amount of decomposing force which has acted upon moss. The best anthracite coal is almost pure carbon, with about one per cent of ashes, while bituminous coal contains a considerable quantity of oxygen, hydrogen and nitrogen. When bituminous coal is heated the hydrogen is expelled, and, rising up in the gaseous form, when it comes in contact with the oxygen of the air it combines with it, burning as a flame. Flame is always the burning of a gas.

PATENT-OFFICE ILLUSTRATIONS.

We have received from Messrs. E. R. Jewett & Co., of Buffalo, N. Y., a handsomely bound volume containing illustrations of all the machines patented during the year 1860. We beg these gentlemen to accept our thanks for this volume. The engravings are superb, and the printing a model of excellence. It is a credit to our government that it has entrusted the preparation of this important work to a firm that cares for its own good reputation. Let any one compare this volume for 1860, with those of 1853, 1854 and 1855, and they will be speedily convinced of the great superiority of the skill of Messrs. Jewett & Co.

In the Province of Nova Scotia, as we learn by a Halifax paper, there are 13,230 hand looms, which produced 1,700,000 yards of home-spun flax and woolen cloth last year.

The Glasgow Mill, at South Hadley Falls, Mass., is now running on full time, after having run half time for the past six months.

The meetings of the British Association for the Advancement of Science are attended assiduously by a number of ladies.

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NOTES ON FOREIGN INVENTIONS AND DISCOVERIES.

Absorbing Sulphur from Gases.—A patent has been taken out by J. G. Williams, of Belfast, Ireland, for the use of brown hematite or other natural form of hydrated oxide of iron in powder, for absorbing sulphureted hydrogen from common coal gas, and from foul places, such as sewers and sinks. A mixture of sulphate of iron, lime and saw dust, has long been used with success in England for accomplishing the same object, but the natural oxide is less expensive and may be used, with greater advantage.

Leather.—A. F. Menard, of Paris, has devised a new process for treating skins. He places skins in a tight vessel, then exhausts the air therefrom, thus opening all their pores. A jet of carbonic acid gas is now injected into the vessel with bisulphide of carbon, and it is stated that this treatment makes leather which is very supple and has water-proof properties. A. C. Stevens, of London, has obtained a patent for the employment of gutta percha and india rubber dissolved in bisulphide of carbon as applied for coating leather to make a water-proof varnish.

India Rubber for Dental Purposes.—R. A. Brooman, of London, has obtained a patent for heating the ordinary india rubber of commerce with sulphide of carbon to render it plastic, and to obtain new dental articles. About twenty-five per cent of the sulphide is used in the combination, and oxide of zinc is mixed with the india rubber and a little carmine added to give it color. The composition, when well kneaded is molded and exposed in an oven to a temperature of 300° or 335° Fah. to vulcanize it.

Improvement in Tallow Candles.—A patent has been taken out by M. de Albytre, of Paris, for making what he calls "Helioclipse candles," as follows :—Take 112 pounds of tallow, and melt it ; then add 13 ounces of alumina precipitated with ammonia. To this add an ounce and a half of the essence of spikenard, and stir the whole thoroughly while maintaining the tallow at its melting heat. When the alumina has combined with the tallow, 40 ounces of the white chloride of zinc and 20 ounces of the chloride of lead are added, and the whole kept heated and stirred for 40 minutes longer. The vessel containing these melted substances is now removed from the fire, the scum taken off, and the mixture is ready to be poured into molds in the same manner that tallow and stearine candles are molded. Candles thus made are said to resemble white wax, and to give a light equal to those made of sperm.

Weaving Frills and Shirt Bosoms.—A. White and M. Macdonald, of Glasgow, have taken out a patent for manufacturing banded frills, ruffles and such like ornamental linen fabrics. Such articles are made with plain woven bands and ruffles or frills combined. Heretofore they have all been sewed by hand, the plain bands being all formed of separate strips of linen and the full frills stitched to these. The new mode of making them consists in using a loom having two warp beams, the one supporting the warp for the plain bands and the other the warp for the frills. These two sets of warps in the loom are operated (shed) by different sets of treadles so that the weft is supplied by the shuttle for each. The warp is drawn off more freely for the ruffled part than for the plain bands, which run lengthwise. This loom executes plain and crimpled weaving in one fabric.

Kamptulicon.—This is an artificial compound, composed of india rubber and ground cork, thoroughly mixed together and molded into large sheets, which are used for partitions in some stables in England, and it has been experimented with as an elastic backing for iron plates in war vessels. A patent has lately been taken out in England by W. R. Jeune for making sheets of Kamptulicon with a web of cloth placed in the middle, and the sheets are formed by passing the compound between heavy rollers. This composition is wery strong, and possesses a considerable amount of elasticity.

A Model Citizen.—The State of Massachusetts seems to be fully awake to the importance of training her citizens for future usefulness. Every voter is now required to know how to read and write, and it is proposed, in addition to these requirements to make every able-bodied voter serve in some military company. Hereafter the model citizen will be he whocan read and write and fight.

RECENT AMERICAN INVENTIONS.

Making Steel.—J. C. Stock and S. E. Emerson, of Trenton, N. J., are the inventors of a new process of manufacturing tools, cutlery and other steel, which consists in first casting the articles of iron with a suitable quantity of oxide of manganese, then converting the cast iron into what is known as malleable iron, by decarbonization, without re-melting, and afterward re-carbonizing it to a suitable degree by heating in an air-tight box, pot or oven with vegetable charcoal ; the entire process being performed so as to retain throughout the shape in which the article was originally cast in iron.

Lamp.—This invention, by S. G. Blackman, of Waterbury, Conn., relates to an improvement in the cones or deflectors of lamp tops, such as are used for burning coal oils, and similar hydrocarbons, which require no excess of oxygen to support proper combustion for illuminating purposes. The object of the invention is to obtain or render available, for illumination, all the light emitted by the flame below the apex of the cone or deflection by a means which will not add, in an appreciable degree, to the cost of construction, and one which will not be frail or liable to break, either by accidently falling or by sudden expansion or contraction. To tbis end the cone of metal is constructed in skeleton form, making what may be termed a frame, the spaces being filled with mica or other transparent substance, whereby the rays of light are allowed to pass through the cone or deflector, and the latter enabled to perform its usual or legitimate function equally as well as heretofore.

Sewing Machine.—This invention relates to the use of a thread-feeding apparatus for feeding the thread to the perforating needle, so combined with the cloth-feeding apparatus that the quantity of thread supplied for each stitch will always be in proportion to or correspond with the length of that stitch ; also to the construction of such thread-feeding apparatus to regulate the supply of thread, according to the thickness of the cloth or other material being sewed. Invented by Robert Welch, of Frankford, Pa.

Gold and Silver Amalgamator.—This invention consists in bringing the pulp, as it escapes from the stamping and crushing mill, in contact with quicksilver by training the pulp bars through a box provided with vertical partitions and zigzag deflections, the latter causing the pulp to bear down in contact with quicksilver, between the partitions, so that all the gold or silver in the pulp may be amalgamated, and the amalgum prevented from escaping from the box with the pulp. Herman Pietsch, of New York City, inventor.

Tweedledum and Tweedledee.

The London *Review* in its notice of the "Lives of Engineers," says that not one of the men who conduced so largely by their works to the greatness and prosperity of England was trained to the calling of an engineer. Each fought his way through difficulties which were apparently insuperable, and the record of their lives must consequently ever afford encouragement to those who have the world before them, and few opportunities for advancing themselves in the great race. In the same number from which the above passage is taken, the President of the United States is sneered at for his origin, and called "Old Abe," the "rail splitter." According to this generous and impartial review, it is a glorious thing for a stout-hearted Englishman to rise from the ranks and make a great name, but it is excessively vulgar for a "Yankee" so to do.

The improvements in mechanics, and the variety of labor that is now done by machinery that was in earlier times accomplished by hand land labor, require the most accurate and perfectly adapted tools. In fact, the accuracy and proper working of machinery depend very much upon the quality of the tools employed in its construction, and to deprive a shop of the improved tools of the present day, andfurnish it with the obsolete instruments of times not very remote, would be equivalent to a destruction of its business.

When Thomas Telford, the eminent English engineer, was working at his trade as a journeyman mason, at about the time of the commencement of the American Revolution, his wages were 18 pence (35 cts.) per day.

What Newspapers and Inventors Say.

Mr. Edwin Bowen, of Meriden, Conn., in acknowledging the receipt of the intelligence of his patent being ordered to issue, writes to us as follows :—

I am very glad to hear that you have been successful n obtaining a patentfor me. I had some thoughts of getting it done by an agent in Hartford as I was working there at the time I commenced getting it up. But I have been a constantreader of your valuable paperfor the last three years, and thought I should be more sure of receiving it through your agency and with less cost than I should through any one else, and it has proved so. If I should ever want any more business of the kind done I shall certainly apply to you. I shall also recommend you to all I know who may want any Patent-Office business done.

Mr. C. W. Street, of Calais, Maine, in acknowledging his patent, says :—

It is with pleasure, that I acknowledge the receipt of the Letters Patent for my Dovetailing Machine. Please accept my thanks for the promptness and energy with which you have conducted the business entrusted to yonr care thus far, and rest assured that any further business that I may have at the Patent Office will be entrusted to your care.

The editor of the Ottowa (C. W.) *Gazette* pays the following compliment to the Scientific American:—

The Scientific American.—This sterling paper commenced anew on the 1st of January. The variety and value of the articles and illustrations with which it is weekly freighted, its long detailed lists of patent claims, the ability with which it is conducted, the elegance of print and paper with which it is got up, and its surprising cheapness entitle it to universal acceptation.

The *Farmer's Advocate*, published at Chicago, Ill., says:—

All agree that the Scientific American is a *ne plus ultra* paper in its department. To the mechanic, it is indispensable, to the lovers of science it is a welcome guest. Its illustrations are worth more than the price of the paper. And every one knows who has ever done any business with Munn & Co. that they are faithful, prompt and reliable. We once procured a patent through them which gave us satisfaction and confidence in their ability to conduct any business connected with the Patent Office. A friend of ours has been about nine months in getting a patent, and paid fees two or three times over to irresponsible agents ; when, had he followed onr advice, and applied to Munn & Co., he would have avoided this long delay andunnecessary expense. We cordially recommend all who want business done with the Patent Office to apply to them. Their charges are moderate.

Messrs. T. H. & H. James, of Stockport, N. Y., in a letter to us of the 11th inst., writes :—

The little influence we possess we will cheerfully exert in your favor. You will please accept our thanks for the favorable result that has attended your prosecution of our claims before the Patent Office. It would perhaps be not improper to say that the ideas that brought out this improvement, were in a measure suggested to us from a careful and constant perusal of your paper.

Mr. W. J. Sage, of Steubenville, Ohio, in a letter to us of the 9th inst., says :

Messrs. Munn & Co.:—*Gentlemen* :—You will please accept my thanks for the energetic manner in which you have pushed forward my claim. The promptness with which you do your work entitles you alone to the rank which you occupy—first and foremost in your profession. With cheerfulness I can recommend all inventors to transact their business through your agency.

The Brain and the Spinal Cord.

The theory that the skull is composed of vertebræ, analogous to those of the spine, is not yet quite firmly established in science. Thus, Professor Owen has recently affirmed it for all classes of vertebrate animals, while Professor Huxley is not averse to it.

In one of his lectures on the nervous system, in the *Medical Times and Gazette*, M. C. Bernard, makes the following declaration respecting the action of the spinal centers: "It is an indisputable truth, that the spinal cord enjoys the property of generating nervous force ; and that when its communication with the brain is intercepted, this force accumulates below the point where its columns have been divided. We here discover another proof of the total independence of this central axis, with reference to the brain ; in other words, the spinal cord is not a mere prolongation of the encephalic mass, but a distinct and independent nervous center, possessing its own special properties, and exerting a direct influence over the nervous system."

According to the *Polyt. Notizblatt* and *Chemical News*, incrustation on the mouth and stoppers of bottles containing caustic in solution, may be prevented by coating them with paraffine, which perfectly lubricates the surfaces in contact and is not acted upon by caustic alkali.

Joseph E. Carver, the well-known cotton-gin manufacturer at Bridgewater, Mass., is about to leave for Port Royal, having an engagement with the general government relative to ginning the cotton gathered in that vicinity by Gen. Sherman's "contrabands."

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Patent Claims

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING JANUARY 7, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

34,045.—Charles Alexander, of Washington, D. C., for an Improvement in Camp Candlestick :

I claim the described combined cup and candlestick, as an article of manufacture, the same being constructed as and for the purpose set forth.

34,046.—S. J. Babbitt, of Hackettstown, N. J., for an Improved Wash Board :

I claim the washboard, A, provided with a rubbing piece, a, corrugated or fluted at both sides, and fitted between the stiles or side pieces, b b, as shown in combination with the rubber, B, applied to the washboard and provided with knobs or semi-spherical projections, a, as and for the purpose set forth.

[This invention relates to an improvement in the ordinary washboard on which clothes are rubbed by hand, and consists in combining with the washboard a rubber so constructed and arranged as to supersede the direct use or application of the hands, by greatly diminishing the labor of washing the clothes, as well as expediting the work and causing it to be performed in a thorough manner, the invention at the same time admitting of the washboard being used in the ordinary way.]

34,047.—H. W. Ball, of New York City, for an Improved Table and Camp Chest :

I claim the arrangement and construction of the hooks, d, sockets, e, detachable legs, D, and hooks, E, with each other and with the divided table top, C, and camp chest, A, so as to operate together as set forth.

34,048.—S. G. Blackman, of Waterbury, Conn., for an Improvement in Lamps :

I claim, as an improved article of manufacture, a cone or deflector for lamp tops composed of metal and mica or other suitable transparent substance, substantially as described.

34,049.—G. W. Bonham, of Henry, Ill., for an Improved Pulverizer and Seed Sower :

I claim, first, The pulverizers, v, arranged on the shaft, d, in respect to each other, when constructed and operating in the manner and for the purpose specified.

I claim, second, Arranging the seed box, c, in the frame, a, on pivots, k, so that the driver can throw the feeder in and out of gear, by the screw, l, arranged at the side of his seat, as set forth.

I claim, third, Attaching the front truck to the front part of the frame, a, and arranging it in relation thereto, so that the dip of the pulverizers can be regulated by the screw, g, and handle, h, in front of the driver's seat, as set forth.

34,050.—P. W. Burnett, of Sacramento, Cal., for an Improvement in Railroad Switch :

I claim the arrangement of the pivoted, beveled levers, M M G G, and grooved levers, H H, with the pendants, J, shafts, I I L L, rods, b b c c, lever, K, shafts, E, cam, D′, and switch rails, B B, as shown and described.

The arrangement of the slotted adjustable pendants, N, with the curved arms, c^t d^t, pins, f^t, shoulders, e^t, and shafts, b^t, as shown and described.

[This invention relates to an improved railroad switch of that class which are actuated by the engine of the train, or by an appendage attached thereto, and which are commonly termed automatic.]

34,051.—A. D. Campbell and Elbert Perce, of New York City, for an Improvement in Casks for Holding Oil, Quicksilver, &c.:

First, We claim the use and application of any compound containing silica to impregnate the pores and crevices of wood or other porous or fibrous materials, suitable for the construction of barrels or vessels for holding quicksilver, petroleum or hydrocarbon fluids, and to fill the joints of said barrels or vessels, in combination with a lining of cloth, paper or other suitable fabric glued to the interior of barrels or vessels and coated with any compound containing silica to render them impervious to the penetrating action of quicksilver, petroleum or hydrocarbon fluids, in the manner above set forth.

Second, We claim specifically the impregnation of wood, or other materials suitable for the construction of barrels or vessels for holding quicksilver, petroleum and hydrocarbon fluids, either before or after such vessels or barrels are made with any solution containing silica, by means of heat and pressure, for the purpose set forth.

Third, We claim specifically the application of a lining of cloth, paper or other suitable fabric, glued to the interior of barrels or vessels for holding quicksilver, petroleum or hydrocarbon fluids, and coated with any solution containing silica, for the purpose set forth.

34,052.—G. D. Denison, of Troy, Ohio, for an Improved Grain Register :

I claim the combination of the box, A, skids, B B′, worm shaft, G, arms, h, wheel, E, index, e, and dial, I, constructed, arranged and operating substantially as shown and explained, and for the purpose specified.

34,053.—D. A. Fiske, of Milwaukie, Wis., for an Improvement in Vapor Lamp :

I claim the arrangement of the removable cap, G, and the bundle of wires, H, filling the tube of said cap, in combination with the cup, R, also the manner of supporting the globe, M, by means of the stem, O, and the socket, L, in combination with the method of attaching and detaching the globe-supporter, W, by means of the screw, P, substantially in the manner and as and for the purposes described.

34,054.—M. P. Gardner, of Huntington Co., Ind., for an Improvement in Mill-Stone Dressing :

I claim the construction and use of the rule, as described and seen in Fig. 3 of drawings, to determine and mark out for cutting parallel lines of dress, so that in running they may perfectly coincide one with the other, as to run more steadily and cut the grain evenly and uniformly.

34,055.—J. E. Gillespie, of Trenton, N. J., for an Improved Hydraulic Governor :

I claim the use of a rotary pump, F G H, in combination with a perforated cylinder, M N, and piston, P, for the purpose of regulating the speed of engines, substantially as above described and for the purpose set forth.

I also claim the use of the reciprocating zigzag bar, 2 3 4 5, in combination with the eccentric, X, and the piston, P, substantially as described and for the purposes set forth.

34,056.—Edwin Gomez, of New York City, for an Improvement in Firing Cannon by Attached Fusee :

I claim the perforated fusee, clamped to the cannon mortar or similar article at the touch hole, for the purposes substantially as set forth.

34,057.—Edwin Gomez, of New York City, for an Improvement in the Construction of Trains or Fuses :

I claim, first, A flat or or tape fusee formed of an explosive compound enclosed in a strip of folded paper protected by a winding of string or an envelope of gutta percha or other suitable material.

Second, I claim the longitudinel strings or cords, d d, in combination with the said flattened or tape fusee, in the manner and for the purposes specified.

Thirdly, I claim the manner set forth of uniting lengths or sections of tape fusee, by the notching or lapping, as specified.

34,058.—B. B. Hotchkiss, of Sharon, Conn., for an Improvement in Canister Shot for Ordnance :

I claim, first, The employment of the inner case, C, divided longitudinally, substantially as and for the purpose described.

Second, I claim the attaching of a bag, H, to the base, B, so as to be capable of folding within the recess therein, and of being unfolded when wanted for use, substantially as shown.

34,059.—W. W. Hubbell, of Philadelphia, Pa., for an Improvement in Explosive Shells for Ordinance :

I claim, first, The vent, 15, opposite and nearly or quite at right angles to the base of the chamber, 4, to receive and discharge the fire as quick as possible, and deliver the water direct on the base of the chamber to diffuse it in the best manner, as described.

Second, Also I claim expanding the fire in an enlarged chamber around the mouth of the burning column, so as to secure a large body of fire to ensure the explosion of the shell, as described.

Third, I also claim combining the percussion exploder with the burning fuse, by securing the cylinder, F, to the inner end of the fuse stock, and providing it with the head for the striking inside of the cylinder, so as to unite the percussion and the fuse principles for explosion, as described.

Fourth, I also claim the lead stopper, r, inserted in and secured to the inner end of the fuse stock, by screw threads or similar means, as and for the purpose described; and also forming the chamber or space, t, between this stopper and the burning column, as described.

Fifth, I also claim the chamber, q, and its opening, p, between the head, M, and the fuse column, as described.

Sixth, I also claim the lead or metallic stopper, z z, in the metal base, or groove covering the holes, x, and releasing on concussion to explode the projectile, as described.

Seventh, I claim the fire chambered water capping combined with the cylindrical fuse opening or stock, carrying the burning column with cylinder opening at the inner end, to hold the fire and explode the shell on impact, as described.

Eighth, I claim the adjustable metallic timing rod, W, in the burning column, or near its side, to adjust the fuse to expode the projectile at any instant of time, as described. Also I claim the strand of quick match, u, in its lower end, to raise and lead the fire down on time, as described.

Ninth, I claim the the fire chamber, 4, in the capping between the water table or plate, 2, and the capping vent, formed by combining them, to prevent extinguishment of the fuse, as described. Also I claim the raised vent, 3, of the water table, into the chamber, as described, to increase its capacity to exclude water. Also I claim the chamber, 1, between the vent, 3, and the orifice of the column, v, as described.

Tenth, I claim forming an enlarged or priming chamber, 7, around or by the side of the timing rod, to insure an ignition of the fuse by presenting a large priming surface for the smaller vent, and allow the timing rod to extend through the capping and be adjusted without interfering with the priming, as described.

Eleventh, I claim the file cuts or fracturing points on the side of the timing rod so as to break it off without the use of an instrument, in adjusting the time in action, as described. And I also claim the quick, or double, three or four-threaded screw on the timing rod, to adjust it quickly, as described.

34,060.—Henry Isham, of New Britain, Conn., for an Improvement in Water Meters :

I claim the combination of the following elements, viz., first, the radial vanes on a vertical shaft; second, the surrounding case provided with a tangential induction pipe or passage, and with a central discharge at the bottom; and, third, the registering mechanism or the equivalent thereof, substantially as and for the purpose described.

And I also claim the flexible diaphragm and vibrating lever attached to it, in combination with the shaft of the rotating vanes and with the registering mechanism, substantially as and for the purpose specified.

34,061.—A. K. Johnston, of Middletown, Conn., and L. Dow, of Topeka, Kansas, for an Improvement in Envelopes of Cartridges for Fire Arms :

We claim, as an article of manufacture, the envelope of a cartridge, constructed as above described and for the purpose set forth.

34,062.—W. R. King, of Yellow Springs, Ohio, for an Improved Apparatus for Evaporating and Distilling :

I claim the combination of the water space, C, and tubes, a a, around and above the furnace, with the evaporating pan situated in the upper part of said water space, substantially as and for the purpose specified.

I also claim constructing the evaporating pan with a plain bottom, and diamond-shaped pipes or passages, N N, connected by partition plates above the bottom, so as to form a flue space, K, therein, substantially in the manner and for the purpose described.

I also claim the combination of the steam pipes, or passages, N N, and their connecting pipes, n n, with the evaporating troughs, M M, and their connecting openings, m m, substantially as described, so that the steam and sirup or liquid flow side by side together through their whole course, in the manner and for the purpose specified.

In combination with these steam pipes, or passages, and troughs, arranged as described, I also claim the strainers, p p, removable as specified, for the purpose set forth.

I also claim the combination of the receiving vessel, H, having a strainer, h, therein, with the heating vessel, G, in such a manner as to receive the clear liquid therefrom, through a pipe, J, below, and the impure liquid therefrom, through a spout, i, or its equivalent, above said strainer, for the purpose specified.

34,063.—I. L. Landis, of Manheim Township, Pa., for an Improvement in Lifting Jacks :

I claim the screw cap, C, with its central neck or elongation, and surrounding cogs, in combination with the double footed or clawed base, I, and friction pulleys, K, on the base of the screw shaft, B, together with the case, R, slotted on both sides, arranged and operated as described and shown in the drawings.

I also claim the adjustable winch or crank, M N, when the same is provided with two sliding clasps, m n, peg, t, holes, s, and spring, P, in combination with its application to either axis, g h, of the cogged wheels, C H, as shown and described for the purpose specified.

34,064.—Daniel Lasher, of Brooklyn, N. Y., for an Improvement in Furnace Grates :

I claim forming the grate bars for furnaces of boilers, &c., with the series of openings, c c, crosswise of the bar, as specified, and so that these bars, when placed together have longitudinal openings between the bars, as set forth.

34,065.—T. Mayhew, of Poughkeepsie, N. Y., for an Improvement in Lamps :

I claim elevating the chimney, F, perpendicular through the medium of the rods or guides, D D, substantially as and for the purpose set forth.

34,066.—John McLain, of St. Mary's, Ohio, for an Improved Automatic Fan :

I claim, first, The particular arrangement of the crank, k, rod, m, arm, n, projecting from the fan shaft, I, for operating the fan shaft from the fusee, i, as set forth in connection with the brake, o, arranged to act against the cylinder, g, substantially as and for the purpose set forth.

Second, The attaching of the stand or upright, B, to the base, A, by means of the slotted plate, b, on tube, a, and the arbor and pin, c d, at the lower end of the upright, B, when said parts thus connected are used in combination with a removable box, C, or block, f, and the cup, D, substantially as described.

[The object of this invention is to obtain a simple, efficient and economical fan operated by clock mechanism, and so arranged that it may be placed upon a table or suspended from the ceiling over a bed, the stand or support of the fan, and driving mechanism also serving as receptacles for various articles which may be required, and hence compensating for the room taken up or monopolized by it.]

34,067.—Daniel Moore, of Brooklyn, N. Y., for an Improvement in Revolving Firearms :

I claim the employment, in a cylinder with chambers open at the rear, of rifling at the forward end of each chamber corresponding with the grooves in the barrel for the purposes and as specified.

I also claim the band or ring, 2, having the recesses, 3 3, for the stop lever or bolt, the said ring being formed as and for the purposes specified.

34,068.—J. A. Morrell, of St. Charles, Mo., for an Improvement in Pumps :

I claim the employment of one or more sliding cylinders having valves suitably arranged in them opening upward, in combination with a stationary main pipe, C, connecting rods, g g, and the eccentrics, G G, on the driving shaft, H, all arranged and operating substantially as and for the purposes described.

[This invention is an improved force pump intended for raising water from deep wells, and for any and all purposes where it is desired to force water a great distance.]

34,069.—Arthur Neill, of Boston, Mass., for an Improved Combined Knife, Fork and Spoon :

I claim, as a new article of manufacture, the combination made and operating substantially in the manner described, viz., the spoon formed with a case or protector sufficient to receive the fork and knife blade, and the knife or fork so formed as to complete a suitable receptacle for the bestowal of the third implement.

34,070.—G. M. Palmer, of Clinton, Mass., for an Improvement in Mode of Attaching Car Wheels to Axles :

I claim, first, The use of the collar, C, or its equivalent, whether forged with the axle or shrunk upon it, or attached to it by any other means, in combination with the wheel, D, and the hub, F, or their equivalents, in the manner and for the purposes substantially as described.

Secondly, The use of the cap, c, or its equivalent, in combination with the wheel, D, the space, g, and the collar, C, or their equivalents, in the manner and for the purposes substantially as specified.

Thirdly, The collar, E, or its equivalents, in combination with the screw, d, the space, f, and the hub, F, or their equivalents, in the manner and for the purposes substantially as specified.

Fourthly, The cap, a, or its equivalent, in combination with the collar, E, the screw, d, the wedge, h, and the shield, l, or their equivalents, in the manner and for the purposes substantially as set forth.

Fifthly, The use of the screw, d, or its equivalent, in combination with the collar, E, and the wheel, D, with its hub, F, or their equivalents, in the manner and for the purposes substantially as specified.

Sixthly, The use of the wedge, h, or its equivalent, in combination with the screw, d, and the collar, E, or their equivalents, in the manner and for the purposes substantially as specified.

Seventhly, The shield, l, or its equivalent, in combination with the space, e, the collar, E, and the hub, F, or their equivalents, in the manner and for the purposes substantially as specified.

34,071.—J. and E. C. Nichols and D. Shepard, of Battle Creek, Mich., for an Improvement in Grain Separators :

We claim the arrangement of the shoe, D, the rock shaft, T, rods, R′ R2, the separating and conducting frames, G H, operated in different directions by means of the crank shaft, J, and its connections, together with the agitating fingers, the several parts operating conjointly for the separation of grain from the straw, as is specified.

34,072.—Herman Pietsch, of New York City, for Improved Gold and Silver Amalgamator :

I claim the construction of the amalgamator, with an induction pipe, B, higher than the induction orifice, a tight horizontal box, A, hooked partitions, D, zig-zag top, E, and inclined divided eduction orifice, C, all arranged as shown and described.

34,073.—G. B. Skinner, of Damascus, Pa., for Improved Water Wheel :

I claim uniting the outer cylinder, A, to the inner one, D, by a series of spiral buckets, B, that leave an open space, c, between themselves and the cylinder, D, substantially in the manner and for the purpose described.

34,074.—R. P. Smith and J. R. Gates, of Louisville, Ky., for Improvement in Mole Plows :

We claim the draining plow, Fig. 4, provided with a press wheel, o, with a concave periphery when used in combination with the double-spool capstan, constructed as set forth, and for the purpose of underdraining.

34,075.—D. I. Stagg, of New York City, for Improved Device for Closing Doors :

I claim the combination of the hinged bars or strips, c c, and the weight or weights, G, arranged and applied to the door, as and for the purpose set forth.

[This invention relates to an improved door-closing device, which is designed to be applied to doors that open or swing both ways. The object of the invention is to obtain a means whereby the door may be kept in a closed state, not only when the draught is equal at both sides of the door, but also when the draught is greater at one side of the door than at the other side.]

34,076.—S. C. Stetson, of North Bridgewater, Mass., for Improvement in Straw and Hay Cutters :

I claim the arrangement of the right angular bar, i k, ratchet wheel, h, and bar, w, operating together as described.

34,077.—W. O. Strong, of Detroit, Mich., for Improvement in Weighing Registers :

I claim the traveling bar, T, with the angular pieces, I and K, attached, in combination with the pin wheel, W, or its equivalent, and springs, either spiral or otherwise, working substantially in the manner and for the purpose set forth.

34,078.—W. A. Sweet, of Syracuse, N. Y., for Improvement in Scroll Saws :

I claim, first, The combination of the adjustable cylinder, K, the valve and wind chest, D, the valve, V, the saw head, F, the saw, B, and the adjustable slides, F and X, substanitally as and for the purposes described.

Second, I claim the loose cylinder, K, when adjusted, substantially as specified, so as to form a yielding hold-down upon the stuff, both by its own weight and atmospheric pressure, for the purposes substantially as described.

Third, I claim attaching the cylinder, K, by the set screw, z, in order to obtain a rake adjustment, substantially as set forth.

Fourth, I claim combining the cylinder, K, enclosing the saw bead, with the auxiliary frame work and set screw, z, or its equivalent, and slotted arms, O′ O′, and set screws, O O, for the purpose of attaining both a lateral and rake adjustment of the saw, substantially as and for the purposes described.

34,079.—A. F. Ward, of Philadelphia, Pa., for Improvement in Telegraphing by Colors :

I claim the use of a table or key, composed of squares arranged as set forth, for the purposes specified.

[This invention consists in the use, in telegraphing by colored plates, flags, lights or other colored objects, of an alphabet table vocabulary or code of signals of which each letter, character or sign is produced by two or more colors or a corresponding number of exhibitions of a single color, the same number of colors or exhibitions of color being used throughout the whole alphabet.]

34,080.—W. S. Thompson, of Rochester, N. Y., for Improvement in Lamps :

First, I claim the means, substantially as described, of preventing the escape of vapor from the wick through the opening left for the ratchet wheels, whereby all danger of explosion is obviated.

Second, In combination with the means recited in the first claim, I claim the arrangement described of the cap, C, burner, B, and ratchet wheel, d.

34,081.—Robert Welch, of Frankford, Pa., for Improvement in Sewing Machines :

I claim, first, Feeding the thread to the needle of the sewing machine, by means of a shaft, L, rotated by positive connection with the cloth-feeding mechanism, substantially as and for the purposes set forth.

Second, The use, in connection with a shaft, L, actuated as set forth, of a cone, M, provided with a number of grooves, c c, to vary the feed of the thread in accordance with varying thicknesses of material to be sewed.

34,082.—Amos Westcott, of Syracuse, N. Y., for Improvement in Churns :

I claim, first, The employment of the diagonal float wheels, b and b b, in combination with the shaft and dasher paddles, c c c c, constructed essentially as and for the purpose described.

Second, The combination of the diagonal float wheel, b b, with the diaphragm, Fig. 3, and chamber, Fig. 4, constructed as and for the purpose set forth.

Also, The trough, f and f f, in combination with the chamber diagonal float wheels and dasher paddles described.

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34,083.—H. P. Westcott, of Seneca Falls, N. Y., for Improvement in Paneling Machines:

I claim the combined arrangement of the spring pressure guide, L, constructed and operating as described, the stationary guide, B, and separately-adjustable disks or cutter heads, D D, substantially as and for the purposes specified.

I also claim the construction and arrangement of the cutters, g g, with the round axle shanks, m m, projecting at right angles from the planes of the cutters' motion, and fitting into sockets of the disks or cutter heads, D D, in positions parallel with the axis of the said disks, thus producing the angular and axle adjustments thereof, substantially as and for the purposes specified.

34,084.—F. G. Woodward, of Worcester, Mass., for Improvement in Breech-Loading Firearms:

I claim the movable breech piece, B, constructed with a recess, b b, groove, g, and recess, s, fitted with a hammer, D, main spring, k, sere, H, and handle, B', and having a screw connection with the breech, all substantially as described, and applied to operate in combination with the trigger, I, and with notch, t, and stud, r, of the breech supporter, substantially as set forth.

[This invention consists in an improved construction and mode of applying the movable breech piece and arrangement of the parts of the lock, in combination therewith, whereby an effective and convenient breech-loading firearm of very simple construction is obtained.]

34,085.—John Ammidon (assignor to himself and L. Streeter), of Springfield, Mass., for Improvement in Harness Buckles:

I claim, as a new article of manufacture, a harness buckle, constructed substantially as described.

34,086.—Edward Browne, of South Reading, Mass., assignor through mesne assistant to B. D. Godfrey, of Milford, Mass., for Improvement in Boots and Shoes:

I claim the double india-rubber sole, formed as described, the edge of the outer sole being turned up to conceal the edge of the middle sole, for the purpose set forth.

34,087.—M. R. Clapp (assignor to himself and Edward Mynderse), of Seneca Falls, N. Y., for Improvement in Steam Fire Engines:

I claim the combination and arrangement of two steam cylinders, the pistons of which move simultaneously in opposite directions, with the pump of a steam fire or other portable engine, substantially in the manner and for the purposes described.

34,088.—Lansing Marble (assignor to himself and Townsend North), of Vassar, Mich., for Improvement in Baskets:

I claim, as an improved article of manufacture, a basket, formed of two series of overlapping splints, A A', extending from side to side, secured by hoops and rivets, and having a conical bottom, B, with central bolt or rivet, d, and otherwise made, substantially as shown and described.

[This invention relates to an improvement in the construction of splint baskets for the use of farmers and others, and is designed to supersede the ordinary woven splint basket, by obtaining greater durability and strength combined with lightness.]

34,089.—E. W. Pierce and W. J. Clark (assignors to W. J. Clark & Co.) of Southington, Conn., for Improved Soldier's Cot:

I claim, first, The employment or use of the bow or equivalent-shaped bars, A, in combination with the jointed rods, c, and canvas B, arranged substantially as and for the purpose set forth.

Second, Having the pieces, b, of the rods, c, at the head of the cot, curved as shown, at e, in order to form a pillow of the canvas at that point, as set forth.

Third, The adjustable bars, f f, attached to the head bar, A, of the cot, when said bars are used in connection with the series of bars or supports, A, and jointed rods, c, as set forth.

[The object of this invention is to obtain a cot which may, when not required for use, be folded up within a very small compass, and still be capable of being very readily extended and adjusted for use when required, and also be light, strong, durable and capable of being manufactured at a reasonable expense.]

34,090.—W. De Witt, of Cleveland, Ohio, for Improvement in Harvesters:

I claim the adjustable slotted cam latch or key, E, connected to the machine at or near the heel of the finger bar, and operated in combination therewith, by means of the lever, L, in the manner and for the purpose specified.

34,091.—B. S. Alexander, of U. S. Army, for Improved Projectile for Rifled Ordnance:

I claim the mode of making the two or more parts of a compound shot adhere together by the use, of tin, solder, or any other metallic compound to which a rim of lead, when cast between those parts, will adhere.

Second, I claim the hole, k, and the plug, l, as a means of relieving the pressure caused by the compressed air or other confined substance, between the two parts of the shot, and tending to separate them, as described.

34,092.—Manasseh Grover, of Clyde Village, Ohio, for Improvement in Plows:

I claim the draft beam, c, fastened by a hinge joint, arranged and operating substantially as and for the purpose set forth.

34,093.—W. J. Pitt, of Middletown, Conn., for Improvement in Revolving Firearms:

I claim, first, The combination and arrangement of the screw, H, recoil shield, lever, F, and rack and pinion, J h, or their equivalents, substantially as set forth.

Second, I also claim the arrangement of the spring, L, thimble, K, and pin, D, in and with the stock, A, substantially as and for the purpose specified.

34,094.—Robert Ramsey, of New Wilmington, Pa., for Improvement in Beehives:

I claim, first, The combination of the slide, B, reversible sliding door, b, and gauze-cover aperture, b2, all arranged as before explained, and for the purposes specified.

Second, I claim the specific combination of the grooved bars, H H, movable bars, I, and sliding sleeves, K, constructed and employed in the manner and for the purposes set forth.

34,095.—J. C. Stock and J. E. Emerson, of Trenton, N. J., for Improved Process of Making Steel:

We claim, the manufacturing of tools cutlery or other articles by first casting the articles in their proper forms of iron, with which a suitable quantity of the oxide of manganese has been combined, then converting them into malleable iron by decarbonization, but without changing their shape, and afterward converting them into steel by recarbonizing them to the requisite extent, by heating, in an air tight pot, or other receptacle, with vegetable charcoal, all as before explained.

34,096.—John Wade of Richmond, Ind., for Improved Convertible Cane and Stool:

I claim, first, The extended division, A, in combination with divisions, B and C, in the manner and for the purpose substantially as set forth.

Second, I claim the combination and arrangement of the divisions, A B C, cap, f, detent, i, spring, j and angle iron, T, in the manner and for the purpose set forth.

34,097.—T. D. Davis, of Syracuse, and J. M. Waldron, of South Otsalia, N. Y., for Improvement in Harvesters:

We claim securing movable blades in dovetail grooves, in the cutter bar, by means of a tapering rod, c, operating in connection with lugs, a, and protuberance, b, substantially as explained.

[This invention consists in an improved manner of attaching a series of movable cutters to their bar, so that they may readily be detached for repair and sharpening, or to replace ano which may be destroyed.]

34,098.—J. W. Hardie, of New York City, and A. S. Hayward, of Boston, Mass., assignor to A. S. Hayward, of Boston, Mass., and J. B. Ogden, of New York City, for Improved Combination of Knife, Fork and Spoon:

We claim forming the handle of the knife, A, of a single piece of metal with the blade, in such a shape as to receive therein the fork and spoon handles, in combination with the formation of the forks and spoon handles, so as to pack securely therein, substantially as specified.

34,099.—J. J. Althouse, of New York City, for Improvement in Plastering Surfaces:

I claim a metallic plastering surface, substantially such as described, for piers, columns, &c., produced during and by the operation of casting, substantially in the manner set forth.

35,000.—J. H. Balsley, of Dayton, Ohio, for Improved Step Ladder:

I claim the employment of the supports, A A, the braces, D, and the horizontal rods connecting front and back of ladder, together with supports, F F, braces, g g, and hinged cross tie, G, arranged, connecting and operating as and for the purpose specified.

35,001.—W. S. Bartle, of Newark, N. Y., for Improvement in Pumps:

I claim the combination of the hollow piston rod, B, capped or closed at the upper end of the valve, E, and head, with the cylinder in which they act, constructed and arranged substantially as described.

35,002.—G. H. Bruce, of Lancaster, N. Y., for Improvement in Bridges:

I claim, first, The combination of a truss bridge frame with an arch bridge frame, so as to combine the strength of the two frames in one bridge, substantially as set forth.

Second, I also claim the tongue wedge, D, in combination with the contiguous groove ends of each pair of principal rafters, in the manner and for the purpose, substantially as described.

35,003.—William Burnett, of Boston, Mass., for Improvement in Gun Stocks:

I claim providing a musket or other like firearm, furnished with a sword or bayonet, with a suitable hand hold at or near the breech, substantially as and for the purpose specified.

35,004.—John Chandler, of Collinsville, Conn., for Improvement in Machinery for Cleaning Emery Wheels:

I claim the employment or use of a water box, or tank, B, supplied with one or more rollers, c, in combination with one or more sliding frames, E', for holding the wheels, G, to be cleaned, all being arranged substantially as and for the purpose set forth.

[The object of this invention is to obtain a simple machine to supersede the manual process of cleaning emery wheels which are now required to be re-coated.]

35,005.—George Collins and Enoch Piper, of Camden, Maine, for Improvement in Pumps:

We claim a pump, having a cylinder, A, constructed of glass, with its ends fitted in metallic heads, B C, as shown, in combination with the piston, E, of two metallic parts, i j, perforated as shown, and provided with the packing, F, and valve, m, and connected together by the screw and nuts, all arranged as set forth.

[This invention relates to certain improvements in reciprocating pumps, and consists, first, in having the pump cylinder constructed of glass or a vitreous substance, and fitted in a peculiar way between metal bands, whereby the cylinder is prevented from being fractured, and is rendered strong and durable.]

35,006.—G. H. Cook, of New Brunswick, N. J., for Improvement in Composition for Lining Tobacco Pipes:

I claim the use of the described composition, for the lining of tobacco pipes.

35,007.—Jacob Dennis, of Marion, Iowa, for Improved Washing Machine:

I claim the adjustable bottom, B, and the rubber, D, when both are constructed, arranged and operated in the manner and for the purpose specified.

35,008.—Adam Eckerson and J. H. Reury, of Pleasant Brook, N. Y., for Improved Washing Machine:

We claim, first, The semicircular, disks, c c', having corrugations on their inner faces, and fitted loosely on a bar passing longitudinally through the box, with the handles, D D, the round bar, spiral springs, g h, and oblong semicircular box, A, when combined, arranged and operating as described.

Second, The longitudinally-sliding disks, C C', round bar, B, spiral springs, g h, box, H, pulleys, e f, treadle, E, and cords, c d, when combined and arranged in the manner and for the purpose set forth.

[This invention consists in an arrangement of lever disk rubbing surfaces in a box of semicircular form, whereby the washing can be effected in an easy and expeditious manner. It also consists in an arrangement of springs and treadle whereby the degree of pressure of the rubbing surfaces upon the clothes can be regulated while they are in motion, to suit the finest or coarsest fabrics.]

35,009.—J. A. Fanshawe and J. A. Jaques, of London, England, for Improved Brush:

We claim, as an improved article of manufacture, a brush or scrubber having continuous concentric or convolute rubbing edges, made as shown and described.

35,010.—G. W. Gilbert, of Bettsville, Ohio, for Improvement in Churns:

I claim the arrangement of the hollow staff, E, follower, F, valve, a, and lever, D, in combination with the partition, B, and loose balls, c c, all constructed, combined and operating in the manner and for the purpose explained.

[The above churn is so constructed as to form butter with great rapidity, and gather it in a compact mass in a separate chamber from that in which the dasher works.]

35,011.—G. P. Gordon, of Brooklyn, N. Y., for Improvement in Printing Presses:

I claim, first, The use or employment of a paper tympan, sheet, operating substantially as set forth, for the purpose specified.

Second, The combination of the nipper arms, provided with the nippers, with the vibrating platen, operating substantially as described, for the purpose described.

Third, The combination of the nippers and grippers, with the nipper arms; also, those with the vibrating platen.

Fourth, The combination of the nippers and nipper arms, with a tympan sheet, operating substantially as described; also, these with a vibrating platen.

Fifth, The combination of the nippers and nipper arms, with the feed table, operating substantially as described, for the purpose specified.

Sixth, The combination of the feed table, with gages constructed and operating substantially as described, for the purpose set forth.

Seventh, The combination of the stationary bed, and the revolving ink-distributing table, with the platen, operating substantially as described.

Eighth, Operating the vibrating inking roller arms or roller frame, by or through the motion of the vibrating platen.

Ninth, Operating the nipper arms, provided with the sheet-taking nippers, by or through the motion of the vibrating platen.

Tenth, The combination of the ink-distributing tables or disks, or a single ink-distributing table or disk, the ink distributing cylinder, and the rocking roller for the purpose described.

Eleventh, Combining the double-revolving, ink-distributing tables or disks, with the ink-distributing cylinder.

Twelfth, In combination with the springs, 8, and roller frame, the sliding rods, 7, holding and carrying the inking rollers, as shown.

Thirteenth, Raising the nippers, when taking or delivering a sheet, to such a hight, above the face of the platen, that the relative position of the vibrating platen and the feed table shall allow the platen to vibrate freely under the feed table, substantially for the purpose set forth.

35,012.—T. S. Lambert, of Peekskill, N. Y., for Improvement in Tourniquets:

I claim, first, The application of the elastic band, in combination with a pad for producing pressure on arteries, in the manner set forth.

Second, The combination of an elastic band with a non-elastic one and with the pads for securing them in place and for making pressure, in the manner set forth.

Third, The application of the wings to the pads so as to permit collateral circulation, in the manner set forth.

Fourth, The attachment of the wings by hinges to the pads, in the manner set forth.

Fifth, The checks on the wings to prevent the bands from slipping, in the manner set forth.

Sixth, The combination of the pads with the wings and inelastic bands, for the purpose of making pressure on blood-vessels, in the manner set forth.

35,013.—Hiram Littlejohn, of Troy, N. Y., for Improved Clothes Frame:

I claim the arrangement of the vertically movable toothed rack, F, in combination with the pivoted radial arms, A, provided with toothed segments, E, and connected together by clothes lines, B, substantially as set forth.

35,014.—Theodore Marschall, of New York City, for Improvement in Pianafortes:

I claim the employment, for the purpose specified, of the rings, c, and screws, d, applied in the manner shown and described.

35,015.—L. G. Marshall, of San Francisco, Cal., for Improved Amalgamator:

I claim the combination of trough, Y, adjusting slide, Z, metallic surface plates, X W, of two inclined tables, batteries, b, of the upper table, and compartments, and sinks, h, of the lower table, all the parts arranged in relation to each other, as described, so that a galvanic current may be made to pass over both tables, and all the batteries, b.

35,016.—J. McClusky, of Milwaukie, Wis., for Improved Apparatus for Submarine Attack on Enemy's Vessels:

I claim, first, The grappling apparatus, consisting principally of two levers, E E, a grappler, F, windlasses, D D and G, chains, e e f, the whole combined and applied to a boat in combination with a drill or boring device, substantially as specified.

Second, The employment as the stock for the drill or other boring tool of a tube charged like a cannon for the expulsion of the said tool, substantially as specified.

[This invention consists in a novel system of grappling and drilling, or boring, apparatus so applied to a boat as to be capable of being worked by steam or other power under its decks to grapple and drill holes in an enemy's ships, and other vessels, below the water line; and it also consists in so combining the drill or boring tool with a cannon that, after having drilled a hole, it may be fired through it from the cannon.]

35,017.—John McElroy, of New York City, for Improvement in Hospital Knapsacks:

I claim, as an article of manufacture, a hospital knapsack for the use of army surgeons, composed of a body of wicker work provided with partitions and doors, arranged substantially as described, and covered with leather or any proper water-proof cloth or material, substantially as set forth.

[This invention relates to a new and improved knapsack for containing medicines, lint, bandages, splints, and surgical instruments. The invention is designed to be carried by the surgeon's servants or attendants during a march or an engagement, and has for its object durability and economy in construction, lightness and convenience of arrangement, whereby the contents of the knapsack are rendered easily accessible.]

35,018.—P. W. Neefus, of New York City, for Improvement in Water Closets:

I claim, first, Working the valves, K and L and W, by the handle or rod, D, or its equivalent, as recited,

Second, Operating the lower valve independent of the upper with the same handle, as described.

Third, The combination of the valves, K and L, rod, D, raising water-valve box, E, and closet valve, A, as set forth.

35,019.—A. Philippi and D. Moore, of Elizabethport, N. J., for Improvement in Railroad Switches:

We claim the loose switch bar, with sloped ends, moving in the slotted rail, and receiving both the flange and tread of the wheel when attached to the shaft, B, and connected with lever and springs, and moved by the train while passing, as described, and for the purposes set forth.

35,020.—Moses Pond, of Boston, Mass., for Improvement in Stoves:

I claim, first, The two ovens, E and F, each having separate and independent flues from the same fire place, in combination with the openings, r and s, and their slides, t, operating as described, and for the purpose specified.

35,021.—Thomas S. Clogston, of Boston, Mass., assignor to himself, and Horace P. Wakefield, of Reading, Mass., for an Improvement in Kitchen Ranges:

I claim, first, The combination of a cubical fire box, with the three water legs of the boiler in contact with the three surfaces of the said fire box as described, so that two of said water legs shall be interposed between the fire and the ovens to moderate the heat thereof, substantially as set forth.

Second, The arrangement and combination of an oven between three water legs of the boiler on three of its sides; while the two flues from the fire box pass over the top of said oven, and thence down its farther side to the bottom of the water legs, and thence around by the out side and to the rear as substantially described.

Third, The oscillating tubular grate, in kitchen ranges, constructed and operating substantially as set forth.

Fourth, The combination of the stationary part, P, with the oscillating grate, substantially as set forth.

35,022.—James P. Ellicott, of Washington, D. C., Improved Refrigerator:

I claim, a rotating refrigerator, L, subdivided into four or more compartments as is herein described, combined and arranged with the pin K, and under frames, L M, and pulleys, N N, substantially as and for the purpose specified.

35,023.—G. E. Vanderburgh, of Mamaroneck, N. Y., assignor to Liquid Quartz Company, of New York City, for an Improvement in Forming Emery Wheels and Grinding Surfaces:

I claim, first, Employing the liquid silicate which is referred to in the body of this specification, of the cementing material in the process of producing articles of artificial stone suitable for cutting, grinding and other purposes.

Second, After any properly prepared gritty or cutting substance has been incorporated with such a proportion of the above-mentioned liquid silicate as will produce a pasty substance into any desired shape, by molding and pressure.

Third, I claim the curing and toughening of the said molded articles of gritty paste, by first subjecting them to the action of a moderate degree of heat for the purpose of drying the same, and then subjecting the said articles to the action of a higher temperature, by the aid of a sand bath or some other analogous heating apparatus.

RE-ISSUES.

1,253.—R. H. Long, of Philadelphia, Pa., for an Improved Arrangement of Steam Engines for Propelling Street Passenger Cars. Patented Jan. 24, 1860. Re-issued Jan. 15, 1861:

I claim the arrangement of the steam engine and boiler relatively to each other, and upon the platform of a railway car, or other carriage, substantially in the manner specified.

[This invention is adapted to railroads in all cases in which a separate locomotive, from its size, would be objectionable, also to the propulsion of carriages on common roads. It consists in the arrangement of the engine and boiler side by side upon one platform of the car or carriage, by which the room for passengers is not decreased, while ample room may be afforded for the engineer upon the platform, with all parts of the engine under his immediate view and control.]

1,254.—R. H. Long, of Philadelphia, Pa., for an Improved Arrangement of Steam Engines for Propelling Street Passenger Cars. Patented Jan. 24, 1860. Re-issued Jan. 15, 1861:

I claim transmitting the power of the engine to the driving axle by

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means of a driving pinion, F, attached to the frame of the engine and arranged relatively to the driving axle to operate substantially as specified.

[This invention relates to the transmission of the power of the engine to the driving axle of a railway car, carriage or locomotive, by means of gearing; and it consists in the attachment of the driving pinion to the framing of the engine in such a position that its axis is in or nearly in the same plane with the driving axle of the car, carriage or locomotive, whereby, whenever the engine is jolted, it causes a slight movement of the driving pinion around the cog wheel, which derives motion from it, without disturbing the gearing, and obviates any injurious effects upon the engine.]

1,255.—L. J., W. S. and C. H. McCormick (assignors to C. H. McCormick), of Chicago, Ill., for Improvement in Reaping and Mowing Machines. Patented May 11, 1858. Re-issued, No. 973, June 5, 1860.

I claim, first, The combination of arms, a o, or their equivalent, with the frame, pinion wheel and driving wheel of a reaping or mowing machine; so that, at one end, said arms or equivalent shall vibrate or turn on or around the axis of the pinion wheel, which gear s into and receives motion from the master cog wheel, and at the other end be properly connected with the axle or journal of the driving wheel, in such manner that, by shifting adjustable fastenings, the hight of the frame and cutting apparatus of the machine, relatively to that of the driving wheel, can be varied without affecting the gearing of the machine, substantially as described.

Second, The combination of the arm or plate connection of the driving wheel with the frame of the machine, substantially as described, or the equivalent thereof, with gearing for changing the velocity and direction of the motion generated by the driving and master wheels, and communicating the same to the cutter.

Third, The combination of said arm or plate connection, with an adjustable wheel on the opposite side of the machine, for raising and lowering the cutting apparatus to suit required changes in the hight of cutting grain and grass.

1,256.—L. J., W. S. and C. H. McCormick (assignors to C. H. McCormick), of Chicago, Ill., for Improvement in Reaping and Mowing Machines. Patented May 11, 1858. Re-issued, No. 973, June 5, 1860.

I claim, first, The combination of the segmental arms or their equivalent, having notches or holes for adjustment, with the frame of the machine and adjusting bolt, or its equivalent, so as to raise and lower the frame and cutting apparatus and hold them in any desired position, substantially as set forth.

Second, Holding the segmental arms or their equivalent to the frame of the machine by means of the hooked head of the bolt or detent in the notches of the sectors, substantially as shown and described.

DESIGNS.

1,508.—E. J. Cridge, of Troy, N. Y., for Design for Plates of a Stove.

1,509.—Robert Ham (assignor to Smith, Sheldon & Co.), of Troy, N. Y, for Design for a Cook's Stove.

1,510.—L. W. Harwood (assignor to P. P. Stewart), of Troy, N. Y., for Parlor Stove Plates.

1,511.—David Hathaway (assignor to Fuller, Warren & Co.), of Troy, N. Y., Design for Cook's Stove Plates.

1,512.—David Hathaway (assignor to Fuller, Warren & Co.) of Troy, N. Y., for Design for a Oven Stove.

1,513.—T. H. Wood, of Utica, N. Y., and H. S. Hubbell and A. S. Hubbell, of Buffalo, N. Y., for Design for a Stove.

1,514.—T. H. Wood, of Utica, N. Y., and H. S. Hubbell and A. S. Hubbell, of Buffalo, N. Y., for Design for a Cook's Stove.

1,515.—T. H. Wood, of Utica, N. Y., and H. S. Hubbell and A. S. Hubbell, of Buffalo, N. Y., for Design for a Cook's Stove.

1,516.—James Williams (assignor to L. M. Williams & Co.), of Philadelphia, Pa., for Design for Trade-Mark.

PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from $30 down to $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention. If susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters, &c.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

TO OUR READERS.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on Design Patents, when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper w n he time for which it was pre-paid has expired.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

Notes and Queries

D. E., of Pa.—It is not new to make cast-iron cannon, with wrought-iron rings. These rings are shrunk on at the rear end by the ordinary shrinking process. Do not be discouraged, the country needs at this time all the ingenuity which can be brought to bear in devising projectiles of war. Something powerful and destructive.

J. T., of Ky.—We are much obliged for your kind letter. We hope always to be found loyal to our country's flag. The attitude of your noble State pleases us.

C. H., of Pa.—There is nothing patentable in your method of manufacturing ordnance. Henry Bessemer, took out a patent in England, January 1855, for essentially the same thing.

A. B. B., of N. Y.—The highest authority on analytical chemistry is Rosé, and we understand that a new edition of his work is about to make its appearance. The treatise of Fresenius is deemed a standard work. Write to Bailliere Brothers, 440 Broadway, New York, for any work on science.

N. E. H., of N. Y.—That water passing through hot tubes filled either with iron filings, coke or charcoal, will be decomposed has long been known. You could obtain a patent therefore only on some improvement in the apparatus or method.

C. H. W., of N. Y.—We do not know where you can procure steel-clock springs on a large scale. By inserting a short advertisement in our paper, we have no doubt you would wake up a customer.

W. H. G., of N. Y.—Your apparatus to be attached to ladies' dresses to prevent them from coming in contact with the ground during wet and unpleasant weather, is not new. The ladies are now provided, to some extent, with a similar apparatus. It is useful and convenient.

S. B. P., of N. Y.—We do not think you can purchase the article you specify in this market.

A. D. B., of Mich.—You can use your invention before applying for a patent, but cannot prevent others from doing the same until you secure your patent.

H. B. & Co., N. J.—We cannot furnish the information you solicit, about the manufacture of muley-saw frames. No such list has ever been published so far as we know.

C. P. K., of Cal.—We do not advise you to use a windmill for the purpose of pumping up water into a cistern 30 feet in hight, and using the water on a wheel for obtaining a constant power. In some situations such an arrangement may be convenient and even economical, but without inspecting the locality personally, we could not give positive advice.

M. P., of Wis.—It requires a very experienced person to purchase diamonds either for cutting glass or furrowing mill stones. We do not know the price of those which you desire to obtain.

J. H. M., of Pa.—A small volume, called "Nystrom's Mechanics," published by J. B. Lippincott & Co., Philadelphia, contains the diagrams and rules which you desire respecting the laying out of gearing.

W. H. B., of N. Y.—Fish oil is that which is obtained from whales, seals and fish—"creatures of the great deep." The cement used for fastening the burners of lamps is plaster of Paris.

SPECIAL NOTICE—FOREIGN PATENT.—The population of Great Britain, is 30,000,000; of France, 35,000,000; Belgium, 5,000,000; Austria, 40,000,000; Prussia, 20,000,000; and Russia, 60,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. Nearly all of the patents secured in foreign countries by Americans are obtained through our agency. Address Munn & Co., 37 Park-row, N. Y. Circulars about foreign patents furnished free.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Jan. 15, 1862:—

T. J. G., of N. Y., $20; E. H. & D. W. R. W., of Iowa, $20; A. K., of Ill., $20. J. W. C., of Vt., $20; G. W. H., of N. Y., $15; G. W. H., of N. Y., $15; F. G. L. S., of Wis., $15; T. O., of France, $15; M. G., of Pa., $25; B. & Van D., of N. Y., $10; J. L. P., of N. Y., $20; M. D., of N., $10; J. H. C., of Conn., $28; R. P. W., of N. Y., $15; T. C. R., of Mass., $45; J. B. P., of N. Y., $45; H. S. W., of Ohio, $10; E. C., of Mass., $15; J. L. T., of N. Y., $25; G. F., of N. Y., $55; W. W., of Iowa, $20; W. J. S., of Ohio, $20; J. P. R., of Mich., $45; T. H. & H. J., of N. Y., $45; D. W. S., of Mass., $20; C. B. M., of Ill., $15; C. W. S., of Me., $25; J. L., of Mass., $25; N. T. B., of Ia., $15; H. S., Jr., of N. Y., $15; J. W. D., of N. Y., $20; B. & C., of Ind., $25; L. B. C., of Conn., $15; Z. K., of Mo., $25; W. H. C., of Mich., $15; J. H. S., of N. Y., $40; E. C., of Ky., $15; T. C. R., of Wis., $25; J. B. W., of Conn., $15; A. McF., of Wis., $15; R. K., of Ill., $40; W. W., of N. J., $25; C. C. C., of Mass., $15; L. P. W., of N. Y., $15; J. M., of Ill., $20; J. D. C., of Wis., $30; E. C., of Conn., $10; T. J. P., of Ill., $45; O. N. B., of Iowa., $20; G. A. D., of Cal., $25; W. M. D., of Mich., $15; A. E. T., of N. Y., $15; G. & M., of N. Y., $15; L. U. S., of N. Y., $25; C. W. H., of N. Y., $25.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Jan. 8 to Wednesday Jan. 15 1862:—

J. L. T., of N. Y.; L. K., of Mass.; M. G., of Pa., J. L., of Mass.; C. W. S., of Me.; L. U. S., of N. Y., B. & C., of Ind.; C. W. H., of N. Y.; J. W. D., of N. Y.; W. W., of N. J.; J. H. C., of Conn.; T. C. R., of Wis.; G. A. G., of Cal; H. N. H., of Mich.; J. B. W., of Conn.; G. F., of N. Y.

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INVENTORS AND CONSTRUCTORS OF NEW AND useful Contrivances or Machines, of whatever kind, can have their Inventions illustrated and described in the columns of the SCIENTIFIC AMERICAN on payment of reasonable charge for the engraving.

No charge is made for the publication, and the cuts are furnished to the party for whom they are executed as soon as they have been used. We wish it understood, however, that no secondhand or poor engravings, such as patentees often get executed by inexperienced artists for printing circulars and handbills from, can be admitted into these pages. We also reserve the right to accept or reject such subjects as are presented for publication. And it is not our desire to receive orders for engraving and publishing any but good Inventions or Machines, and such as do not meet our approbation in this respect, we shall decline to publish.

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These wheels are consolidated upon an entirely new and scientific principle. Composed of pure Turkish Emery, free from glue, rubber, vulcanite, and all other glutinous substances; they are the only legitimate Emery Wheel ever introduced into the market.

They are manufactured of every number of Emery, fine or coarse, moulded to every size, and made in quality to any degree of hardness. They are true, and carefully balanced; and, as they always present an even surface, and do not glaze, are unequaled for cutting, grinding, sharpening and polishing purposes. Their durability and efficiency commend them as a matter of economy, to all workers in metals. We subjoin the following from many testimonials:—

MORGAN IRON WORKS, NEW YORK, Nov. 30, 1861.

NEW YORK EMERY WHEEL CO.—*Gentlemen:* Having given the Patent Solid Emery Wheel manufactured by you a severe trial, I do, without hesitation, pronounce it the best wheel I have ever used, as it cuts quick, wears slow, and does not glaze or soften by friction.

Respectfully yours, JOHN GALLIGHER,
Foreman Morgan Iron Works.

A descriptive circular, containing a list of prices, &c., will be forwarded on application. Address NEW YORK EMERY WHEEL CO., No. 28 Frankfort street, New York. 4 1

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EMPLOYMENT! AGENTS WANTED!! A NEW enterprise.—The Franklin Sewing Machine Company want agents, at a salary of $40 per month and expenses paid. For particulars address, with stamp, HARRIS BROTHERS, Box 302 Boston, Mass. 4 4

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PICKERS.—RICHARD KITSON, HEAD OF WORTHEN Street, Lowell, Mass., manufacturer of Kitson's Patent Cotton Mixer, Kitson's Patent Cotton Opener, Kitson's Patent Cotton Picker, Kitson's Patent Cotton Waste Machine, and Rag Picke; also Budd's English Scutchers (pickers), of the following celebrated patterns:—Walker & Hacking; Lord & Brothers; Taylor, Lang & Co. Manufactures Needle Pointed Card Clothing, for Carding Hemp, Jute, Flax, &c. 4 4*

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2. That the Government, as the ordinance of God, must put down rebellion and uphold the Constitution in its integrity.

3. That every citizen is bound to support the Government under which he lives, in the struggle to reëstablish its authority over the whole country.

4. That the Constitution of the United States is the supreme law of the Government as well as of the people; that the war should be prosecuted solely to uphold the Constitution and in strict subordination to its provisions: and the war should be arrested, and peace concluded, just so soon as the people now in revolt will lay down their arms and submit to the Constitution and laws of the land.

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Fig. 1.

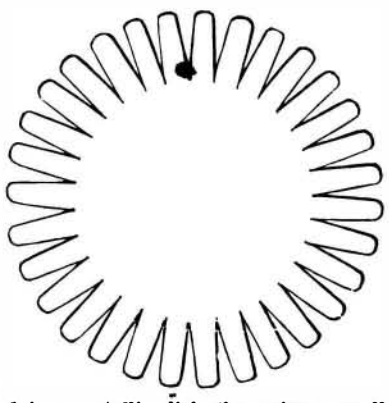
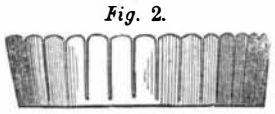


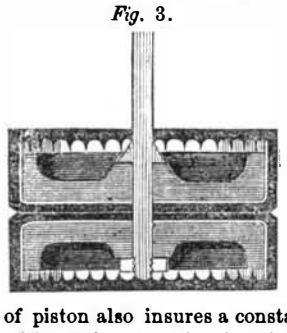
Fig. 1 is a metallic disk (brass is generally preferred, as being sufficiently elastic without liability to rust,) notched all round, so as to admit of being bent up in the form of a crown, as shown in Fig. 2.

Fig. 2.



A better idea, however, of this invention may be derived from a sectional view, which will show how these springs operate. Fig. 3 is a sectional view of a piston for a force pump, with its appendages. The two piston plates will be observed, between which the springs, Fig. 2, are inserted, with ordinary cupped leathers. The outward pressure of these springs operates to keep the edges of the leathern cups in close contact with the working barrel at all times, effectually counteracting the natural tendency of the leather to shrink, and withdraw when dry. The construction of piston also insures a constantly water-tight joint, without the necessity for tight packing, always objectionable on account of the loss of power it entails, as well as its injurious action on the pump barrels, especially in situations where particles of sand or gravel are liable to be raised with the water.

Fig. 3.



THE CONSTRUCTION OF CHIMNEYS.

The object of a chimney is to conduct the products of combustion from a fire inside of a house and discharge them into the atmosphere outside. In performing this unction it also secures a supply of fresh air to the fire to promote and support the combustion of the fuel. The principle upon which the draught of a chimney is secured and regulated is based on the difference in the specific gravity of the hot air and smoke arising from the fire, and the cold air of the atmosphere. The heated products of combustion being lighter than the outside air, ascend by their expansive force, and at the same time the colder air descends and flows into the fire to supply the place of the ascending current. It is thus that an outward current is maintained from a fire, otherwise the smoke and carbonic acid gas would remain in the apartment in which the fire is maintained. The ruling feature of a chimney is to control the expansive current of warm air and smoke, so that its force will be maintained to overcome the pressure of the atmosphere outside and thus maintain an outflowing current.

Chimneys are deservedly held to be worthy of high rank among the great blessings of modern civilization. It is now very well ascertained that such contrivances were unknown to the ancients. The Romans performed their cooking and heating with chafing dishes. There are no chimneys in the houses of Herculaneum and Pompeii, and but few if any chimneys are to be found at the present day on the houses in the warmer districts of Italy. In the thirteenth century chimneys were unknown in England: each family made their fire in a hole in the middle of the floor, which was covered when the inmates retired to bed. It is supposed, though not clearly established, that chimneys were first used in the hilly and colder portions of Savoy and Piedmont, and from thence the improvement was communicated to France, Germany and England.

Chimneys are still unknown among savage races of men. In cold weather they make their fires on the floors of their huts, and the only exit for the smoke is a hole in the roof. Such rude dwellings are usually filled with smoke, which is the cause of frequent inflammation of the eyes, and among barbarous white tribes it colors their skin a rich amber hue, rivaling that of a smoked ham. Several of the rude races of northern Europe have skin as yellow as those of the natives of Southern Africa, all caused by peat smoke. When well scrubbed with soap and water and permitted to reside for some months among civilized people, who have chimneys in their houses, these races become as fair as any of the Anglo-Saxon Celtic family.

There is considerable practical science involved in the construction of chimneys. It is well known that many of them smoke and the plague of a smoky chimney is put in the same category with "a scolding wife." Among the first who treated the subject of chimneys in a philosophic manner, was that wisest

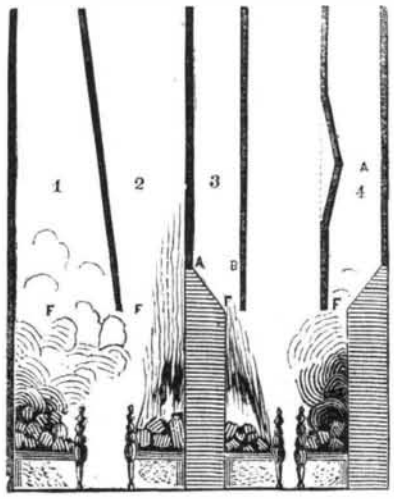


Fig. 1. *Fig.* 2. *Fig.* 3. *Fig.* 4.

and most practical of our philosophers, Franklin, who published a treatise on the subject in 1785. This essay was followed by one on the same subject by Count Rumford—another American philosopher of a most practical cast of mind. These two authors have laid down the principles upon which all chimneys should be built, and the accompanying figures illustrate how the draught may be controlled (as described by an old correspondent) in chimneys which have open fires below on andirons and grates.

Chimneys are frequently built in log houses on the plan of Fig. 1. The fire being built upon the hearth, it has abundance of room to enter the chimney at the flue, F, but the hole at the top being small, compared with the flue, F, there is no room for the warm air and smoke to get out of the way of the cold air rushing in below, and it will be continually puffing out into the room.

On the other hand, if the plan be reversed, as in Fig. 2, and the chimney increases in size upward, from the flue to the top, the draught will be excessive, and the greater part of the heat will go up the chimney, as in an air furnace.

A medium between these two plans, at Fig. 3, will create a regular and not excessive draught.

In Fig. 3, the flue is (as it should be) the smallest place in the chimney. In ascending from the flue upward, in the course of about one foot the chimney should widen, or rather deepen off to about two and a half times the width of the flue. If we suppose the flue to be four inches, in ascending one foot, the distance from the inside of the front at B, to inside of the back at A, should be sixteen inches; and then if we suppose the width of the fire place to be three feet, the caliber of the chimney on the inside at A B, will be 36 square inches. And the caliber should not be less at any point above than at A B. There will be room for all the smoke which enters the flue to pass upward without impediment.

The chimney may be brought into a different shape, so as to make it appear well at the top, but still the number of square inches in the caliber should not be lessened. Thus in the case of the chimney, supposed to be 360 square inches at A B, in Fig. 3, it may be sixteen inches by twenty-four in the inside at the top, or 384 square inches—a not unusual size of chimney tops.

On the other hand, if there be any curvatures or projections which impede the smoke in its passage upward, as in Fig. 4 at A, such circumstances will have a tendency to prevent the proper draught of smoke, especially in bad weather.

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